

THE IRON AGE

THURSDAY, AUGUST 2, 1888.

New Side Crank Engine.

We illustrate on this page a new design of plain slide-valve engine turned out by the W. T. Adams Machine Company, of Corinth, Miss., in sizes of 40, 50, 60, 75 and 100 horse-power.

The bed is cast in one piece, lying close to the foundation its entire length, combining strength and solidity. It is held to the foundation by a double line of anchor bolts. The cylinder is bolted to the end of the bed, as shown. The ports in the valve-seat are very large, being as long as the diameter of the cylinder will allow, so as to get steam into the cylinder, use it and get rid of it in the shortest possible time. The steam-chest is bolted to the side of the cylinder. It is of good length

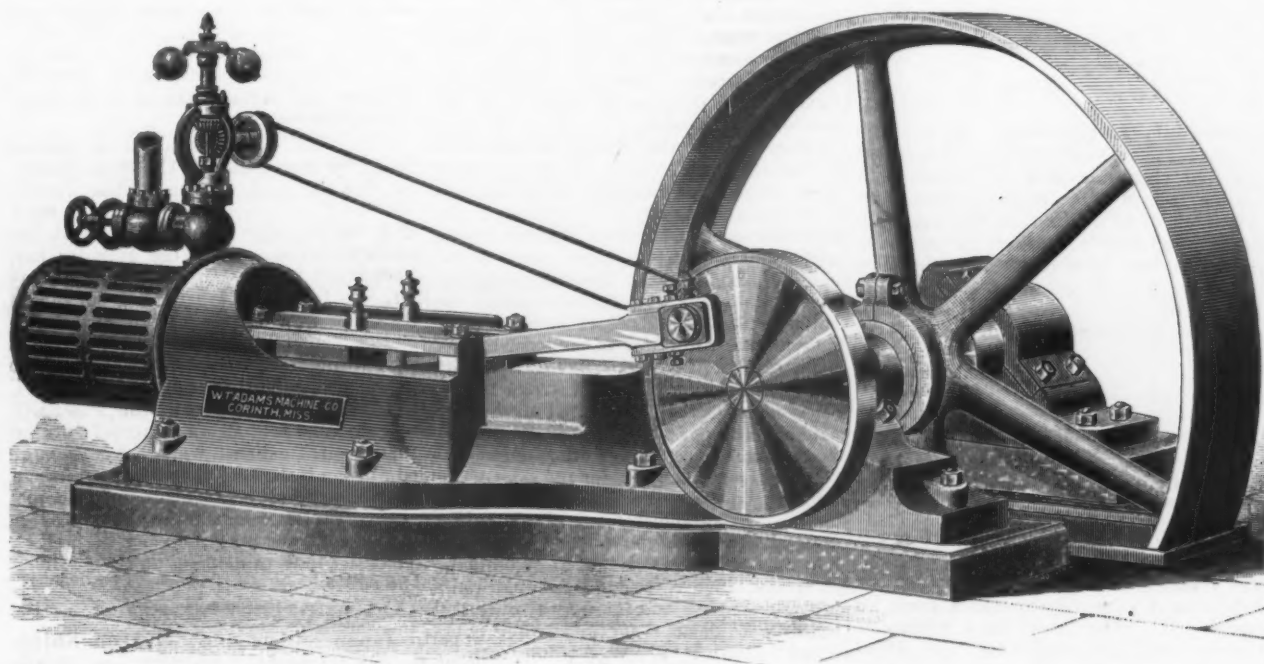
workingman and the State." That was embodied in a resolution expressive of the sense of the Congress upon the subject.

Material for Propeller Blades.

In a paper on "The Material Best Suited for Propeller Blades," recently read before the British Institution of Naval Architects, Mr. W. C. Wallace presented data regarding the strength, durability and cost of propeller blades made from cast iron, steel, gun metal, manganese bronze, phosphor bronze, delta metal, and aluminium bronze.

Until recent years, according to Mr. Wallace, cast iron was the material most generally in use for propeller blades, and is still in favor with some engineers. Its

coating, and thus setting up galvanic action. The present price for finished steel blades is from \$175 to \$200 per ton. Gun metal has been used almost as early as cast iron, but the use was restricted to the Royal Navy and to small private vessels. It has great resistance to corrosion, the life of the blades being in most cases longer than that of the ship; but owing to the galvanic action between the blades on the hull serious pitting would take place in the stern frames and plating if the latter were not protected by placing strips of zinc round the inside of the propeller aperture. The zinc is consumed, but the hull is preserved. The quantity of zinc required for a propeller of 20 feet diameter is about 3 cwt., and must be renewed every 12 or 15 months, at a cost of about \$50. In point



SIDE CRANK ENGINE, BUILT BY THE W. T. ADAMS MACHINE CO., CORINTH, MISS.

and narrow, avoiding long and wasteful steam passages. The cross-head is of the locomotive style, with wide bearing on the guides and is screwed to the piston and secured by a jam-nut. The pillow-block is cast solid to the frame at an angle of 45° and has large and long bearings, lined with anti-friction metal. The crank is counterbalanced, shrunk on the main shaft and secured by a steel key accurately fitted. The wrist-pins of these engines are made so that their diameter exceeds their length in the journal. The overhang of the crank is very much reduced and entire rigidity secured.

Prof. Francis Wayland, whose motion to that effect was adopted by the recent Prison Reform Congress, contends that without productive prison labor the work of prison reform cannot be accomplished. If the prisoner is to be reformed he must have work for his hands to do in which his mind will be interested, or, as the idea is otherwise presented, "that any scheme which has a tendency, direct or indirect, to promote or permit the idleness or unproductive labor of prisoners will inflict irreparable injury upon the prisoner, the

most serious defect is its liability to fracture, and the increase in thickness of the blade necessitated thereby. It is not to be recommended where trustworthiness is a desideratum, but has the advantage of being cheap, of preserving the true form of the screw in casting, and of having a smooth surface. Cast-iron propeller blades require to be renewed every five or six years. The cost of finished blades may be taken as from \$100 to \$120 per ton.

The introduction of mild steel as a material for propeller blades has been a great improvement, rendering them absolutely trustworthy as regards strength, but bringing about the evil of corrosion. The blades become so pitted and broken in a few years that they have to be renewed, and with steel it is not possible, as with cast iron, to burn on new tips. The life of steel blades varies from 3 to 6 years. Many attempts have been made to protect steel blades from becoming pitted by a covering of some other metal. Tin has been applied to the back of the blades near the tip, and brass plates have also been used to cover that portion of the back of the blades which is most subject to corrosion. It is, however, extremely difficult to prevent water from getting behind the

of strength gun metal is only slightly ahead of cast iron, but it is not so brittle. The present price for finished blades is about \$650 per ton.

Manganese bronze, like gun metal, is free from corrosion, but is difficult to cast, and sets up galvanic action, requiring the application of zinc, as already explained. Its price is about \$25 higher than that of gun metal. Phosphor bronze has an ultimate tensile strength of 15.8 tons, and in this respect is not much superior to either gun metal or manganese bronze; but its elongation is 17½ per cent., showing its great ductility. No large propellers have, so far as the author is aware, been made of this metal; but in steam launches and torpedo boats it has been used. The price of finished blades is \$850 per ton. Delta metal, which is an alloy of copper, zinc and iron, and which has a breaking strength of from 15 to 23 tons, with an elongation of from 10 to 20 per cent., has to a limited extent been used for the propellers of sea-going ships; but the author was unable to speak either of its trustworthiness or of its lasting qualities. The price for finished blades was given as \$575 a ton, or five times that of cast iron, and three times that of steel.

Aluminium bronze has up to the present been little used for propellers of any size; but if aluminium brass is all that the advocates of this material claim for it, Mr. Wallace considers it likely that it will be largely used for propellers. An 8½ per cent. aluminium bronze is recommended by one of the officials of the United States Navy for twin screws, but the high price of \$1175 per ton for finished blades renders its adoption in the merchant navy almost impossible. The following table contains a summary of the strength and elongation of the various materials above enumerated:

	Ultimate tensile strength. Tons per square inch.	Elongation. Per cent.	Weight to break bar 1 in. by 1 in., 12 in. between supports. Cwts.
Cast iron.....	10	.....	18
Steel.....	31	10	55
Gun metal.....	14	9	23
Manganese bronze.....	15	.....	28
Manganese bronze (by Bronze and Brass Co.).....	.....	.....	45
Phosphor bronze (by Phosphor Bronze Co.).....	16	17	24
Delta metal.....	19	15	.....
Aluminium brass.....	34	2	.....

Practical experience has led to steel blades being made 25 per cent. thinner at the root than cast iron, while for manganese bronze and aluminium brass an allowance of 30 per cent. may be assumed. Delta metal may be allowed 25 per cent. reduction, and gun metal and phosphor bronze each a reduction of 10 per cent. Making these allowances, the relative cost of blades compared with cast iron is as follows:

	Cost per ton.	Equivalent cost of blades for every ton of cast iron blades.
Cast iron.....	£24	£24
Steel.....	38	33
Gun metal.....	130	144
Manganese bronze.....	135	123
Phosphor bronze.....	170	153
Delta metal.....	115	110
Aluminium bronze.....	145	139

The relative first cost is, however, not the only item of expenditure which must be considered. Shipowners must remember that the renewal of blades and the difference in power consumed are also important matters.

The Operation of the Steam Jacket.

In a recent article on "The Theory of the Steam Engine," the London *Engineer* refers as follows to the mode of operation of the steam jacket:

It is a very crude statement that it does good because it keeps the cylinder hot. It might keep the cylinder hot and yet be a source of loss rather than gain; and, as a matter of fact, it is doubtful now if the application of steam jackets to all the cylinders of a compound engine is advisable. It is well known, too, that circumstances may arise under which the jacket is powerless for good. Thus, for example, the late Mr. Alfred Barrett, when manager of the Reading Ironworks, carried out a very interesting series of experiments with a horizontal engine, in order to test the value of the jacket. This engine had a single cylinder fitted with a very thin wrought-iron liner, between which and the cylinder was the jacket space. The jacket was very carefully drained, and could be used either with steam or air in it. Experiments were made on the brake with and without steam in the jacket. They were repeated alternately, the conditions being in all respects similar to those obtaining during competitive trials by the Royal Agricultural Society. The result

was a practically infinitesimal gain by using steam in the jacket. In one word, the loss by condensation was transferred from the cylinder to the jacket. On the other hand, it is well known that single-cylinder condensing engines must be steam jacketed if they are to be fairly economical. Circumstances alter cases, and the circumstances which attend the use of jackets are more complex than appears at first sight.

In considering the nature of the work to be done, we must repeat a fundamental truth which we have been the first to enunciate. A steam engine can discharge no water from it which it did not receive as water, save the small quantity which results from loss by external radiation and conduction from the cylinder and from the performance of work. At first sight the proposition looks as though it were untrue. Its accuracy, will, however, become clear when it is carefully considered. After the engine has become fully warmed up the cycle of events is this: Steam is admitted to the cylinder from the boiler. A portion of this is condensed. It parts with its heat to the metal with which it is in contact. The piston makes its stroke and the pressure falls. The water mixed with the steam is then too hot for the pressure. It boils and produces steam, raising the toe of the diagram in a way well understood and needing no explanation here. During the return stroke the pressure falls to its lowest point, and the water, being again too hot for the pressure, boils and is converted into steam, which escapes to the atmosphere or condenser without doing work and is wasted. The metal of the cylinder, &c., falls to the same temperature as the water. At the next stroke the entering steam finds cool metal to come into contact with, and is condensed as we have said, and so on. But the quantity condensed during the steam stroke is precisely equal to that evaporated during the exhaust stroke, and consequently no condensed steam can leave the engine as water. Let us suppose for the sake of argument, however, that an engine using 20 pounds of 100-pound steam per horse per hour discharges 2 pounds of water per horse per hour. As each of these brought, in round numbers, 1185 thermal units into the engine and takes away only 212 units, it is clear that each pound must leave behind it 973 units; consequently the cylinder will be hotter at the end of each revolution than it was at the beginning, and the process would go on until condensation must entirely cease.

It will be urged, however, that a steam jacket certainly does discharge water, and that in considerable quantity, which it did not receive; and as this is apparently indisputable, we are here face to face with one of the puzzles to which we have referred. The fact, however, is in no wise inconsistent with what we have advanced. If an engine with an unjacketed cylinder regularly receives water from the boiler that engine will discharge precisely an equal weight of water. The liquid will pass away in suspension in the exhaust steam. The engine has no power whatever of converting it into steam. The case of a jacketed engine is different. Such an engine will evaporate in the cylinder water received with the steam, but it can only do so at the expense of the steam contained in the jacket. For every 1 pound of water boiled away in the cylinder 1 pound of steam is condensed in the jacket, and the corollary is that if an engine was supplied with perfectly dry steam there would be no steam condensed in the jacket, save that required to meet the loss due to radiation and the conversion of heat into work. The effect of the jacket will be to boil a portion of the water during the close of the stroke, and so to keep up the toe of the diagram, and so to get more

work out of the steam. If, however, the steam was delivered wet to the engine it is very doubtful if the jacket could be productive of much economy. The water would be converted into steam during the exhaust stroke, and no equivalent would be obtained for the steam lost in the jacket.

In a good condensing engine about 3 pounds of steam per horse per hour are condensed in the jacket. The cylinder will use, say, 15 pounds of steam, so that the total consumption is 18 pounds per horse per hour. It is none the less a fact, although it is not generally known, that the average Lancashire boiler sends over about 8 per cent. of water in the form of insensible priming with the steam. Now, 8 per cent. of 18 pounds is 1.44 pounds, so that in this way we have nearly one-half the jacket condensation accounted for, as just explained. One horse-power represents 2562 thermal units expended per hour, or say 2.6 pounds of steam of 100 pounds pressure condensed to less than atmospheric pressure; and $1.44 + 2.60 = 4.04$ pounds per horse per hour, as the necessary jacket condensation if no water is to be found in the working cylinder at the end of each stroke. That this quantity is not condensed only proves that the water received from the boiler, or resulting from the performance of work, is not all re-evaporated.

Something still remains to be written about the true action of the steam jacket, but this we must reserve for the present. We have said enough, we think, to show that, as we have stated, the jacket has more to do than keep the cylinder hot. With jacketed engines more than any others it is essential that the steam should be dry. In the case of an unjacketed engine water supplied from the boiler will pass through the engine as water and do little harm, but if the engine is jacketed, then the whole or a part of this water will be converted into steam, especially during the period of exhaust, when it can do more good than if it were boiled away in a pot in the engine-room. This is the principal reason why such conflicting opinions are expressed concerning the value of jackets. That depends principally on the merits of the boiler.

Japanese Lacquer for Iron Ships.

—The Japanese Admiralty has finally decided upon coating the bottoms of all their ships with a material closely akin to the lacquer to which we are so much accustomed as a specialty of Japanese furniture work. Although the preparation differs somewhat from that commonly known as Japanese lacquer, the base of it is the same—viz, gum-lac, as it is commonly termed. Experiments, which have been long continued by the Imperial Naval Department, have resulted in affording proof that the new coating material remains fully efficient for three years, and the report on the subject demonstrates that, although the first cost of the material is three times the amount of that hitherto employed, the number of dockings required will be reduced by its use to the proportion of one to six. A vessel of the Russian Pacific fleet has already been coated with the new preparation, which, the authorities say, completely withstands the fouling influences so common in tropical waters. It occupied the native inventor for many years to overcome the tendency of the lac to harden and crack, but having successfully accomplished this, the finely polished surface of the mixture resists in an almost perfect degree the liability of barnacles to adhere or weeds to grow, while presumably the same high polish must materially reduce the skin friction which is so important an element affecting the speed of iron ships. The dealers in gum-lac express the fear lest

the demand likely to follow on this novel application of it may rapidly exhaust existing sources of supply.

Swedish Bar Iron and the English Merchandise Act.

Some recent decisions by the English customs authorities respecting the marking of Swedish bar iron in accordance with the Merchandise Marks act are said to be causing great alarm among Swedish iron manufacturers, and to have led to diplomatic negotiations between the English and Swedish Governments. As is generally known, a large quantity of Swedish bar iron imported into this country bears the words "Lancashire-Swedish," or "Lancash-Swedish," which designation has hitherto obtained for it a free entry. Now, however, the English custom authorities, guided by the provisions of the new act, have decided that, unless the bars in addition bear the words "manufactured in Sweden," or "produced in Sweden," all such imports will be forfeited to the British Crown. This has given rise to great excitement, and even indignation, in Sweden, as it is considered that we are treating Swedish iron with undue severity, and that, considering the benefit the English iron industry derives from the imports of Swedish bar iron, and its re-export in the finished state, the trade should be rendered every facility. The Swedish minister in London is said to have received instructions to urge upon the English Government the advisability of relaxing the severity of this clause in the act in favor of Swedish-Lancashire iron. An adverse decision would, it is urged by those interested in the trade, be very serious, as there are large stocks of bar iron on hand in Sweden with the old brand. Several Swedish journals also take the opportunity of pointing out that, according to the new law, it is forbidden—under pain of forfeiture—to import into England, as has hitherto been done, Swedish made iron bearing the name or brand of some English manufacturer or dealer, even if affixed at the request of the firm in question, and even if accompanied by a written certificate to that effect.

London *Iron* says: "We trust the English Government will not allow itself to be persuaded to relax the due administration of the provisions of the Merchandise Marks act in the least, either in the case of Sweden or any other country, for the act is doing immense good to English industry. As to the request of the Swedish Government said to have been addressed to our Government, it seems rather a cool proceeding on the part of Sweden, after the passing by its legislature of a highly protective tariff, to ask for consideration. It is an unblushing proceeding, and the sooner Swedish manufacturers and exporters, and the Swedish public generally, are made to see the matter in its true light, the better for the amicable relations of the two countries."

The Steamer Puritan.—The launch of the side-wheel steamer *Puritan*, at Chester, Pa., July 25, was attended by a number of distinguished builders and engineers. The *Puritan*, a sister ship to the *Pilgrim*, built at the same yards six years ago, is 420 feet over all, 404 feet on the waterline, 52 feet beam, 91 feet breadth above guards, 20½ feet hold, 63 feet height of dome from floor and draft of water 12 feet; gross tonnage, 4650 tons; estimated displacement, 4200 tons. She will be propelled by compound beam engines. The low-pressure cylinder will be 110 inches in diameter, 14 feet stroke, and the high-pressure one will be 75 inches in diameter and 9 feet stroke. There will be eight steel return tubular boilers averaging 7500

horse-power. The vessel is expected to develop a speed of 21 miles per hour. Her hull is of steel, built on the longitudinal and bracket plate system of naval architecture. She has 56 water-tight compartments and six water-tight bulkheads. Her main deck is of steel and she is unsinkable and fire-proof. Her saloon and stateroom accommodations will be superbly finished in the choicest woods and finest upholstery and she will have 110 more staterooms than the *Pilgrim*. Her steering-gear is worked by steam. The galloos-frame for the walking-beam is constructed of steel and iron and weighs 35 tons. Nothing in the way of American inventive genius that money can procure will be lacking in this handsome vessel to afford safety to passengers. Her cost will be \$1,500,000. She will be ready some time next season to take her place on the line from New York to Fall River. She will receive her boilers and machinery in this city.

Natural Gas Suit.

A very important suit to all natural gas consumers, and which will result in the determining the power of the courts in the matter of fixing the rates for natural gas, was commenced in the courts at Pittsburgh on Friday the 20th ult. It is in the form of a bill in equity, filed by the Faraday Carbon Company against the Philadelphia Natural Gas Company. The Faraday Carbon Company are engaged in the manufacture of carbon points for electric lights, and operate large works in the above-named city. The bill alleges, first, that the Philadelphia Company are common carriers, and as such exercise the right of eminent domain and have obtained great privileges from the Pittsburgh City Councils. It is further asserted that the Philadelphia Company have entered into a fraudulent and illegal combination with the Pennsylvania and the Chartiers Natural Gas Companies for the purpose of increasing the price of natural gas furnished to the public, and by reason of this combination the plaintiffs can at present only obtain a supply from the Philadelphia Company.

The plaintiffs were notified last June by the officials of the Philadelphia Company that the price of gas was to be largely increased, and a new contract would have to be signed. The plaintiffs thereupon determined to abandon the use of gas as fuel under their boilers, but to continue it for their heating furnaces, ovens and other machinery. This the Philadelphia Company refused to permit, and insisted that if any gas at all was furnished it would have to be used in all the operations of the factory. The price asked for the gas was equal to about 9 cents per 1000 feet, while, it is alleged, other persons are being supplied at rates ranging from 3 to 5 cents per 1000 feet. The plaintiffs offered to pay a reasonable price, but it was refused, and they were notified that the gas would be shut off from the factory unless the new contract was signed at once. The Faraday Carbon Company assert that if the gas is cut off, as threatened, they will suffer great loss, and therefore wish the Court to intervene. The Court is asked to grant an injunction to restrain the Philadelphia Company from cutting off the supply of natural gas; to fix a reasonable price at which the gas shall be furnished, and to set aside as void the combination between the Philadelphia, Pennsylvania and Chartiers Companies.

The Louisville and Nashville Railroad Company advertised for bids for 500 freight cars a few days ago, and bids were received from 11 car-building companies, the figures ranging from 5 per cent. to 10 per cent. lower than last year's prices.

New Coke Furnace at Mayville, Wis.

The blast furnace at Mayville, Dodge County, Wis., is now in successful operation, having been blown in on the 1st ult. It is practically a new furnace, although it consists in part of the charcoal furnace long operated by the Northwestern Iron Company, of Milwaukee. The local ore, to smelt which this furnace was originally built, is a fossil ore, similar in many respects to the Clinton ore of New York, but it decrepitates very easily, and being found usually in small detached pieces it is locally known as flaxseed ore. Owing to its fineness it had been found somewhat difficult to handle in the old furnace, which therefore ran but irregularly. The deposit is so immense, however, that the owners desired to turn it to more profitable account, and, consulting with the well-known engineer, John Birkinbine, of Philadelphia, they concluded to take his advice and remodel their furnace to use coke. The work of reconstruction was put in his hands, and his ideas were embodied throughout.

The dimensions of this furnace now are 65 feet high and 13½ feet diameter at back. The old boilers were retained, and two batteries of new boilers were added, each consisting of two upper boilers, 44 inches in diameter and 60 feet long, with two 14-inch flues and two lower boilers, 38 inches in diameter and 26 feet long. The hot-blast apparatus consists of two 24-pipe Weimer suspended stoves. A Weimer blowing engine having a blowing cylinder, 6 feet in diameter, with a 4-foot stroke, supplies the blast. A Crane hoist elevates the stock by an inclined plane to the tunnel head. The fuel used is exclusively Connellsville coke. Limestone is obtained in the immediate vicinity of the ore beds. The ore now used consists of about 50 per cent. of the local fossil ore and 50 per cent. Lake Superior ore. The local ore is mined very cheaply, being shoveled from the bed into the cars, and is very clean, requiring no preparation for the furnace, and works well with Lake Superior ore in making a good foundry pig iron at low cost. The furnace is located within such a convenient distance of the soft ores of the Menominee and Gcgebic ranges that their use in connection with the local ore will enable the furnace company to make a variety of pig iron to suit the demands of the market.

The furnace is now yielding about 50 tons of pig iron daily, but it is not yet working up to its capacity, as the owners are experimenting on mixtures and have, therefore, been obliged to proceed carefully, watching the result of every change. An increase of 20 per cent. in this production is expected soon and much better results are predicted when perfect smoothness of operations is secured. A large output of pig iron is, however, not the only result aimed at. The local fossil ore is an ideal basic ore containing the proper contents of phosphorus and silica for the manufacture of basic pig iron. The opportunity will exist in operating this furnace to demonstrate whether the ore can be easily and profitably smelted for the manufacture of basic steel. The owners have strong faith in the ultimate value of their ore property and propose to ascertain what it is really worth for metallurgical purposes generally.

The furnace will be known as the Mayville Furnace and the pig iron will be marketed as the Mayville brand. Pickands, Brown, & Co., 115 Dearborn street, Chicago, are exclusive sales agents. The Spring Lake Iron Company, of Milwaukee, are operating the furnace as lessees from the Northwestern Iron Company. I. M. Bean is president of the company and H. S. Fleming is superintendent of the furnace.

The Tabor Sand Molding Machine.

Sand molding machines for general foundry work have become recognized as labor-saving devices of no small importance, and every new and tried design of this class is therefore of interest. We take pleasure, accordingly, in giving on this page and the one opposite illustrations of the Tabor machine, built by the Tabor Mfg. Company, 111 Liberty street, New York.

It has always been customary for the molder to pack the sand around the pattern with a hand rammer. This gives him a chance to anticipate the varying depths of the pattern, and to ram more or less as the

and any number of castings made from such molds will have a uniform weight and will be true to the pattern. The value of this exact duplication is two-fold and cannot be overestimated; it means economy in material and a large saving in labor if castings are to be fitted or finished.

In the Tabor machine the pressure exerted on a mold is not affected by the amount of sand in the flask—for instance, if more sand than is required be used, the mold will not be harder nor will it be softer if less sand be used, as in either case the downward motion of the rammers ceases when the resistance of the sand equals the pressure on the piston. It is only necessary to see that enough surplus sand is

ward projecting lugs in contact with reverse projections on the pattern frame in the truck, thus relieving the truck and its outside framing of all strains due to the pressure of ramming and insuring the pattern being forced into the sand its full depth. The upper ends of the strain-bars pass between flanges on the sides of the cylinder and are secured by steel pins. Through the upper ends of the bars and the cylinder-flanges are a number of holes for raising or lowering the cylinder to suit the different depths of flasks.

The operation of molding is as follows: The pattern being set, one-half the flask (cope or nowel) is put on the plate, joint-side down. On top of the flask is placed

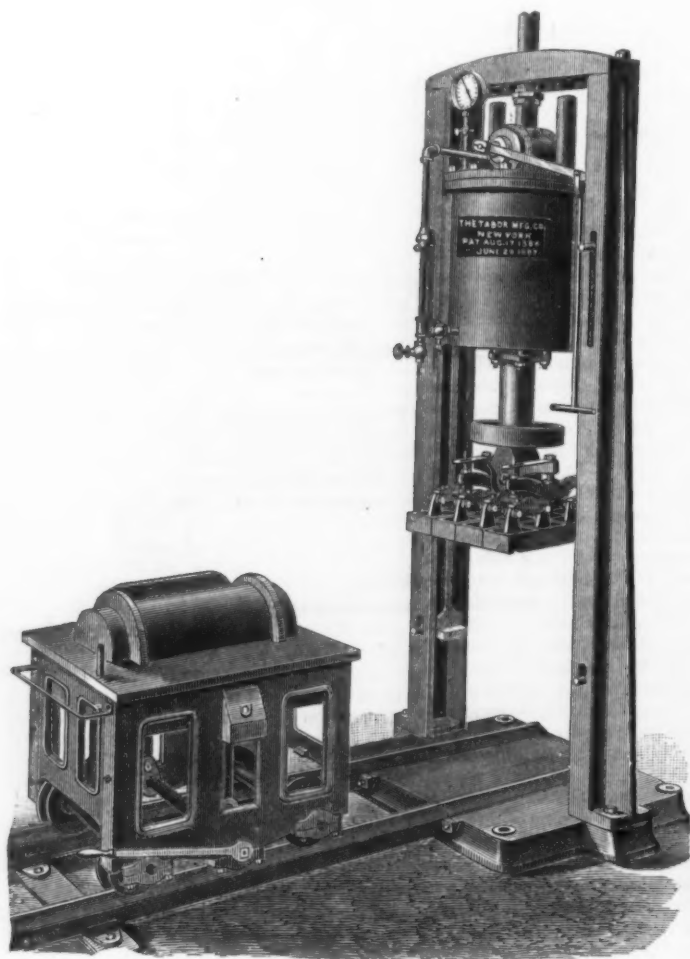


Fig. 1.—Ready for Flask.

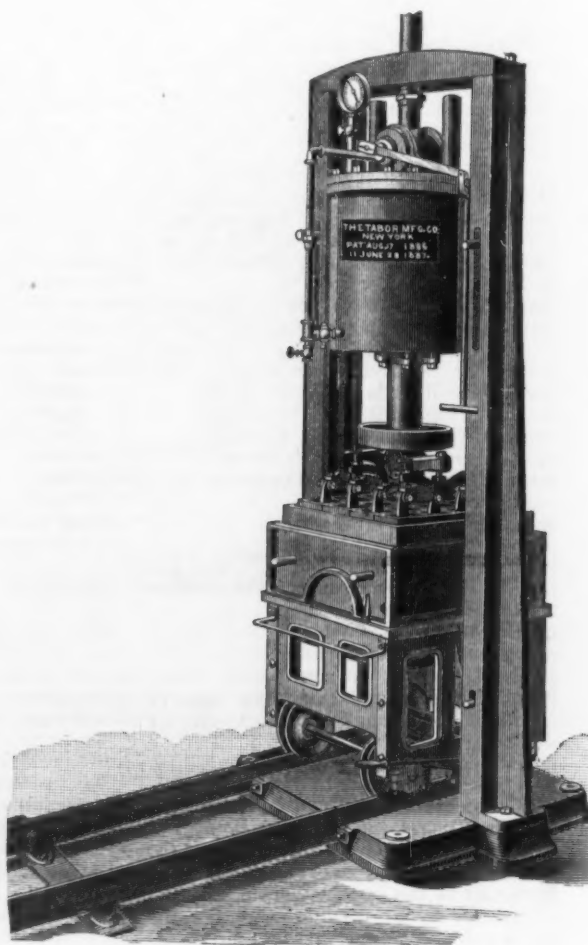


Fig. 2.—Flask Under, Ready for Ramming.

NEW SAND MOLDING MACHINE, MADE BY THE TABOR MFG. CO., NEW YORK.

depth of the sand requires, so as to get a mold uniform in density around the pattern. This is simply a question of judgment with him, which is sometimes good, but frequently bad. In fact, he may ram the mold so hard that the gases cannot escape in pouring, and the casting will "blow;" and at other times make the mold so soft that the casting will "strain," in either case making bad work. The molder draws his pattern by hand, and should the pattern have considerable depth, with little draft, it will be necessary to rap it sufficiently to loosen it so that it may be drawn without breaking the mold. This is objectionable, as more rapping in one case than another makes the mold larger, and consequently the casting is heavier, thus wasting iron. It necessarily follows that if the molds are rammed with equal pressure, and the pattern drawn from the sand without rapping, each mold will be a perfect duplicate of the other,

used to allow for the compression, which means simply to fill the sand box. When the machine rams a mold all the sand in the flask is pressed down in one unbroken body, packing the sand uniformly and leaving the mold, it is claimed, more porous than when made by hand, and venting is therefore required.

The machine consists of a base with extending tracks for a truck or carriage and upright columns, between which is an inverted cylinder. Into this cylinder is fitted a piston and rod, the lower end of which is provided with a group of rammers or pressers. A pair of strain bars are, moreover, provided, which, when ramming, relieve the uprights, and there is, finally, a movable truck on which the pattern and flask are placed. The strain-bars are supported by steel pins, which pass through slotted holes in the lower ends of columns. These slotted holes allow the bars to lift and bring their in-

a sand-box of sufficient depth to hold the surplus sand used in compression. The flask and sand-box are then filled with sand from a hopper overhead (or it may be shoveled in by hand); the truck is run under the machine, steam turned into the cylinder above the piston and the rammers or pressers are forced downward on the sand. When the rammers cease their downward movement the sand is thoroughly and uniformly packed; the steam is then exhausted from the upper side of the piston and admitted to the under side and the hammers raised to their former position; the truck is withdrawn from under the machine, the sand-box removed, the top of the flask "struck off" and the pattern drawn downward from the mold through the stripping-plate, or drawn by hand in the usual way if no stripping-plate be used. One-half of the mold is now finished and ready to go on the floor. The operation will be more clearly un-

derstood by examining Figs. 3 and 4. In these the following references are used: A, pattern; B, pattern-plate; C, stripping-plate; D, cross-head or pattern frame for drawing pattern; E, stool or column for holding up sand; F, cranks. When the pattern is to be drawn by hand, a plane-plate is used on top of the machine, on which is placed the pattern, or follow-board and flask.

The group of rammers is made in size to suit the flask for which the machine is intended. These rammers are so arranged on equalizing levers that each rammer receives its share of the pressure and has a movement independent of the others, so that over a pattern where the sand is deeper under one rammer than under another, the one over the greatest depth of sand may go down until the mold is uniformly packed. On account of the friction of the sand on the sides of the flask, the marginal rammers are attached to the shorter ends of the levers, so that they may get an increased pressure equal

per day will, under unfavorable circumstances, equal the work of four molders, and under favorable conditions the product will equal the work of double that number. Two more men with an extra truck, working on the opposite side of the machine, will double the capacity.

The machine is now in use at the works of the following firms: The Pond Machine Tool Company, Plainfield, N. J.; B. W. Payne & Sons, Elmira, N. Y.; the Union Switch and Signal Company Swissvale, Pa.; the Cooke Locomotive Works, Paterson, N. J.; the Solid Steel Company, Alliance, Ohio, and Westinghouse Air Brake Company, Pittsburgh, Pa.

Surface Condenser Calculations.

In the paper on "Surface Condensers," presented at the recent Nashville meeting of the Society of Mechanical Engineers and briefly referred to in our report at the time, Prof. J. M. Whitham, the author,

a decrease of 10 per cent. will suffice in Arctic waters.*

Professor Marks† gives the formula:

Condensing surface in square feet =

$$\frac{W(H - T)}{0.1 \text{ to } 0.2 C(T - T')}$$

Where W = pounds of steam sent to the condenser per hour.

H = total heat units in 1 pound of steam at the boiler.

T = mean temperature of the circulating water.

T' = temperature of the vacuum.

C = 556.832 for brass and 642.543 for copper tubes, as found by Isherwood, and shown in the table of § 4.

Professor Whitham, in passing on to a formula which he proposes, remarks that the area of the condensing surface depends upon the quantity, quality and temperature of the exhaust steam, the initial and final temperatures of the circulating water, the character of the exposed surfaces and

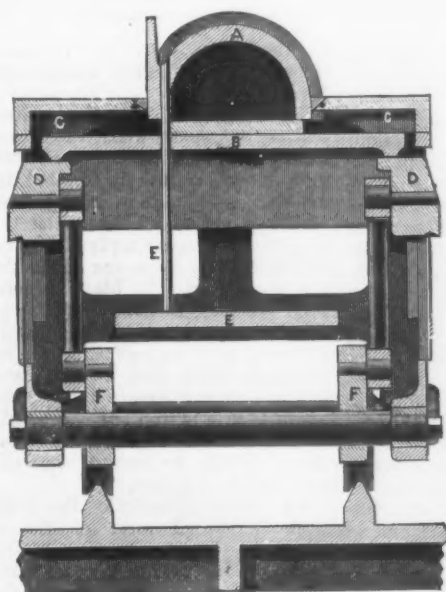


Fig. 3.—Section through Pattern, Ready for Flask.

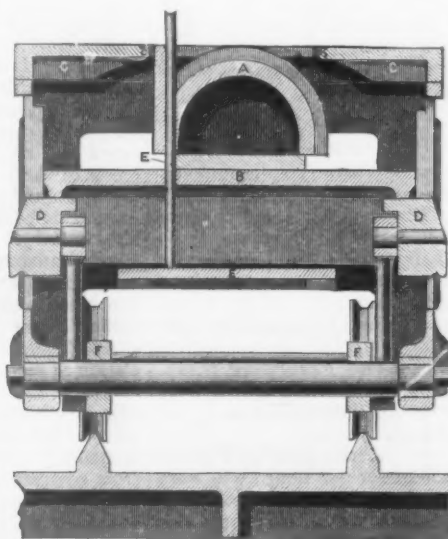


Fig. 4.—Section Showing Pattern Drawn through Stripping Plate.

NEW SAND MOLDING MACHINE, MADE BY THE TABOR MFG. CO., NEW YORK.

to the friction, and prevent the molds from dropping when the flask is handled. The piston has sufficient stroke to allow for a change of 3 inches in the depth of cope or nowel without changing the position of the cylinder. A pan surrounds the piston-rod just above the rammers, which catches any drip from steam or water that may come from careless packing of the stuffing-box; this prevents any wetting of the sand.

It is recommended that a sand conveyer, elevator and riddle for handling the sand be used. The conveyer running through the center of the floor carries the sand to an elevator, which raises it to the riddle, through which it passes into the hopper over the truck; from the hopper it is dropped into the flask as required. Sand handled in this way is thoroughly broken up and evenly tempered. While the sand elevator is an important factor in the economy of the system of molding, it is not a necessity. The machine can be used very profitably without it. Any pressure medium, such as water or compressed air can be used in the rammer cylinder, but steam, for several reasons, is considered preferable. As to the output of the machine we are told that with one truck and two men the amount of work turned out

gave attention to several methods used in calculating condensing surface.

Among them he referred to the following formula by Rigg, in his work on "The Steam Engine": Condensing surface in square feet =

$$\frac{\text{Pounds of steam condensed per hour}}{8.93 \text{ to } 7.81}$$

This formula permits about 8000 British heat units to be transmitted through a square foot of condensing surface per hour and assumes that about 1000 units are given up by each pound of steam condensed.

Seaton* gives the following proportions, when the circulating water enters the condenser at a temperature of 60° F.: I. Absolute terminal pressure of steam in the condensing cylinder. II. Square feet of condensing surface per indicated horsepower),

I.....	6	8	10	12.5	15	20	30
II.....	1.50	1.60	1.80	2.00	2.25	2.50	3.00

When the vessel is to cruise in the tropics the values given in the table must be increased 20 per cent.; when she occasionally visits the tropics, 10 per cent.; while

* Manual of Marine Engineering, by A. E. Seaton, p. 198.

the metal used. The methods given by Rigg and Seaton do not cover all the requirements. Professor Marks's rule is not exact, because the heat given up by the steam to the circulating water is not nearly so great as $W(H - T)$, and because the wide range in the value given to the thermal conductivity of the metal—i. e., from 0.1 to 0.2 C. is misleading.

In studying the action of the surface condenser, Professor Whitham makes the following assumptions, as warranted by the experiments given in §§ 3, 4 and 5, viz.:

1. The temperature of the steam side of the tube is uniform throughout its length (Joule), and the steam is saturated at a temperature corresponding to the reading of the vacuum gauge. This latter assumption, though arbitrary, is probably sufficient.

* P. A. Engineer John A. Tobin, U. S. Navy, in his report on the "Improvements in Naval Engineering in Great Britain" (Ex. Doc. 48, Forty-seventh Congress), gives "The proportion of condensing surface to the horse-power in 15 of the most recent (1885) types of high-speed merchant steamers by the best Scotch builders averages 1.95 to 1. This proportion compared with the data of seven steamers, taken from a paper read before the Institution of Mechanical Engineers by Sir F. J. Bramwell in 1872, having a ratio of 3.18 to 1, shows the saving effected in this direction during the past ten years."

† § 55, Marks's "The Steam Engine," 1887.

ciently exact, since (a) the fluctuations of the reading of the guage are inappreciable; (b) the exhaust port is opened and closed gradually, steam is exhausted throughout all or nearly all of the stroke of the piston, and the steam is condensed as soon as it arrives in the condenser; (c) the steam in the cylinder, at the end of its expansion, is almost certain to be wet, even with steam-jackets, and this wet steam, on account of free expansion during the exhaustion, is saturated when it reaches the condensing surface. This is still further probable because the condenser pressure is always several pounds below the terminal pressure in the condensing cylinder.

2. The temperature of the water side of the tube has a value equal to the arithmetic mean between the initial and final temperatures of the circulating water.

3. The conductivity of the surface is increased as the quantity of circulating water used is increased. This quantity of water will vary inversely as its rise in temperature.

4. The number of heat units transmitted per hour through a unit surface depends directly upon the difference between the temperature of the sides; varies with the material used, and is independent of the thickness of metal used for the tubes, as found in ordinary practice.

The formula which he deduces is of the following form :

$$S = \frac{WL}{180(T - t)}$$

in which *S* represents the condensing surface in square feet; *T*, the temperature of the steam in the condenser, or that of saturated steam corresponding to the pressure indicated by the vacuum gauge, in degrees F.; *t*, the mean temperature of the circulating water; and *L*, the latent heat of saturated steam at the temperature *T*. This formula applies to an engine having an independent circulating pump. When the pump is worked by the main engine, the value of *S* should be increased about 10 per cent.

The value of *W*, the pounds of steam sent to the condenser per hour, will vary with the type of engine used, initial pressure of steam, ratio of expansion, and whether the cylinders are steam-jacketed or not. No more reliable data are accessible on this point than the results of Messrs. Loring and Emery, and here summarized, viz. :

Type of condensing engine.	With or without a steam-jacket.	Absolute steam-pressure in boilers. Pounds per sq. inch.	Pounds of steam used per I. H. P. per hour.	Condensing surface. I. H. P.
Two cyl. compound, 90°.....	With.	55	22	2.08
Two cyl. compound, 90°.....	With.	85	18.4	1.74
Non-compound.....	With.	27.5	33 to 37	3.12 to 3.5
Non-compound.....	With.	55	22 to 26.5	2.08 to 2.53
Non-compound.....	With.	85	20.5 to 25	1.94 to 2.36
Non-compound.....	Without.	27.5	40 to 44	3.78 to 4.15
Non-compound.....	Without.	50	26.7 to 31	2.54 to 2.93
Non-compound.....	Without.	85	21.7 to 25	2.05 to 2.36

In designing, Professor Whitham points out, it is never well to anticipate a vacuum exceeding 25 inches of mercury when the engines are developing full power. This corresponds to about 2.5 pounds pressure. So that *T* = 135 and *L* = 1020, and may be reduced to

$$S = \frac{1020 W}{180(135 - t)} = \frac{17 W}{3(135 - t)}$$

The value of *t* will vary with the quantity of circulating water used and the season of the year. It being the arithmetical mean of the initial and final temperatures of the circulating water, is about 60 in the winter and 75 in summer. Since the larger value of *t* gives the greater value of *S*, we will substitute *t* = 75, and becomes

$$S = \frac{17 W}{3(135 - 75)} = \frac{17 W}{180}$$

The pounds of circulating water required per hour is as

$$\frac{W(L + T - T)}{R}$$

T being the temperature of the condensed steam as it leaves the condenser—i. e., the temperature of the hot well and *R* the rise in temperature of the circulating water.

A Texas Iron Enterprise.

Texas is to become more notable than it has been in iron manufacturing, a new company, the Cherokee Land and Iron Company having been formed to work the brown hematite of Cherokee County. The State has for years manufactured iron at Rusk, Texas, and the new company, which control about 20,000 acres of iron and timber lands, is to build a 50-ton furnace at New Birmingham, a projected town. The enterprise is being conducted by H. H. Wibirt, of New York; R. L. Coleman, of St. Louis, and A. B. Blevins. Mr. John Birkinbine, of Philadelphia, has made a report on the property from which the following extracts are taken: "The ore deposit is remarkable for its apparent uniformity, and exhibits greater regularity as to stratification than any brown hematite ore field of which I have cognizance. When the hills are of sufficient elevation, the ore appears with remarkable persistency as a nearly horizontal bed, which crops out along the sides and near the crests of the hills forming the rolling country of the neighborhood. The entire formation is of a late geological age, probably tertiary. A section would represent a soft sandstone, remarkably free from grit in many places, resembling in color and the ease with which it can be cut or turned when freshly quarried, the caenstone of France. On this the ore lies with a seam of clay, generally between the ore and the stone. The ore is capped by a thin layer of feruginous sandstone, while on top of this is the sand. The ore is brown hematite, varying in physical structure from compact masses to laminated and in some cases coarsely granular ore, and in color from light brown to nearly black; occasionally a glossy surface and incipient pots and botryoidal forms are found in the tules resulting from ledges breaking away, bowlders and fine ore abound, the latter forming a decided "blossom." The

thickness of ore and 3 feet average thickness of sand stripping, taking out the ore by benching:

The cost of winning 1 ton of raw ore is estimated at.....\$0.65
Allow for loss 20 per cent. in roasting..... 0.13
Cost of roasting..... 0.17
Hauling or tramping to the blast furnace. 0.18

Cost of 1 ton of roasted ore..... 1.13

These figures will probably be reduced in the earlier history of a new enterprise, as the initial stripping will be light, but it should safely represent the cost of ore for a series of years and permit the assembling ores from various points which may vary somewhat in physical character or chemical constituents. Using the data as given, the following estimate of the cost of producing 1 ton of charcoal pig iron from local ores is presented:

Cost of Making 1 Gross Ton of Charcoal Pig Iron.

2 tons of roasted ore at \$1.13.....\$2.26
4-10 ton of limestone at \$2.50..... 1.00
110 bushels of charcoal at 6 cents..... 6.60
Labor at furnace..... 1.45
Office and superintendence..... 0.35
Incidentals and supplies..... 0.30
Interest depreciation and repairs..... 1.00

Total.....\$12.96

Or, say, \$13 for a gross ton of iron ready for shipment.

The results obtained at the Rusk penitentiary demonstrate that the ores obtained from the district under consideration produce an iron eminently adapted for foundry purposes, having tenacity, fluidity and chilling properties. Immediately joining the State furnace is a pipe foundry, where cast-iron water pipe are made from iron run direct from the blast furnace into a large receiving ladle. As these pipes, to meet the requirements of engineers' specifications, must be cast thin, and subjected to a hydrostatic test, under a pressure of 300 pounds per square inch, some of the qualities of the iron are exhibited in their manufacture. An examination of broken pieces of pipe or casting showed a very satisfactory fracture.

The foundry inside of the penitentiary walls produced most of the castings, amounting in value to about \$100,000, for the new State Capitol building at Austin, Tex., some of which were long fluted columns, others ornamental orioles, &c., and in addition made stove and other castings. Upon the output of the foundry considerable machine work was necessary, and an investigation of the work in progress in the machine shop demonstrated that the iron was well adapted to treatment by the various tools.

The Marshall Car and Foundry Company, at Marshall, Tex., use the pig iron produced at the State blast furnace alone in the manufacture of car wheels regularly, and during my late visit a contract was made to supply a new car-wheel foundry at Houston, Tex.

Pig iron which so well answers the requirements of foundry practice should find a good market in a State of such vast dimensions, and which is making so many rapid strides in internal development as Texas, and the demand for foundry irons is now, or very soon will be, more than equal to the capacity of an iron furnace of moderate size. The only information concerning the use of the pig iron made from the Cherokee County ores in rolling mills show that it could be puddled and made into bar iron or other shapes. The Helmbacher Forge and Rolling Mill Company, of St. Louis, made the following test: A bar 1/2 inch square, separated under a tensile strain of 54,200 pounds, equal to 60,000 pounds to the square inch. The elongation in a 6-inch bar 1/2 inch square was 1/4 inch in 6 inches. The result of the examinations made lead to the following conclusions:

1. That the ore deposits of Cherokee County, Texas, are of such extent as to

physical characteristics are such as to indicate an ore which works kindly in the blast furnace, and this expectation is borne out by the operation of the furnace at the penitentiary.

The furnace erected by the State of Texas and operated by its penitentiary convicts, has mined to date from the the neighboring hills about 40,000 tons of ore, and the average thickness of the ore from four benchings on different hills is found to be 30 inches, the maximum (except at specific points where a local pocket exists) being 40 inches. An approximate estimate, based on calculations and verified by actual operation, would bring the yield of ore per acre of benching at from 5000 to 8000 tons. On the basis above assumed—viz.: 24 inches average

encourage their utilization by the erection of blast furnaces to smelt their ores.

2. That the pig iron produced will be of a character for which there will be a ready demand in the district most conveniently reached.

3. That there is an abundance of wood of good quality for producing charcoal at very satisfactory rates.

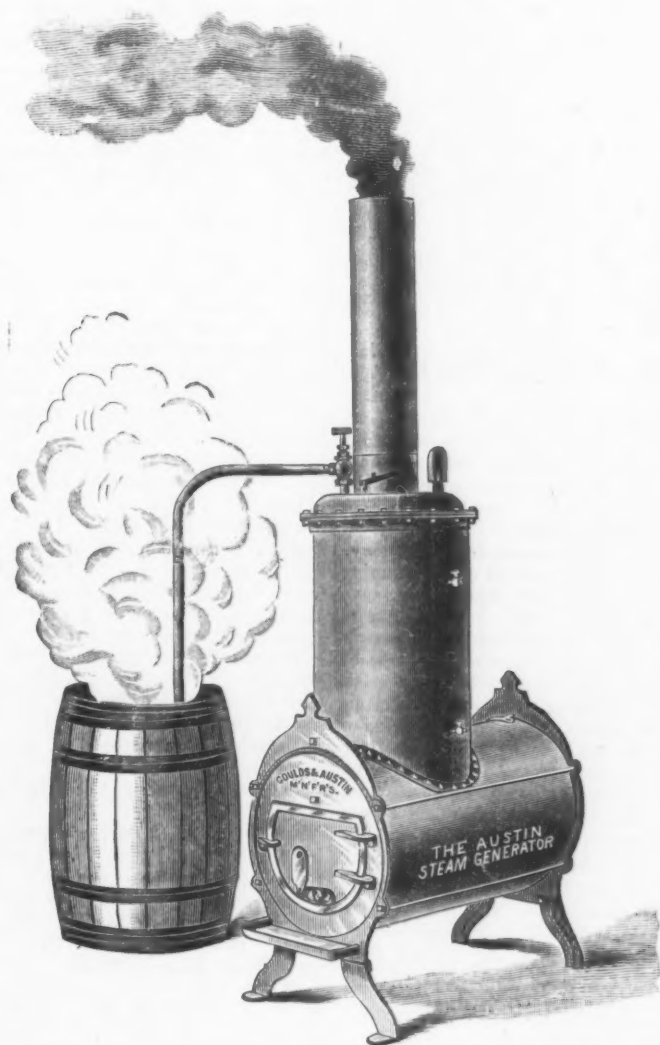
4. That the flux, while now costing too much per ton of iron, can be reduced to a cost which will not interfere with the financial success of a blast furnace enterprise.

5. That labor is abundant and the character of the adjacent country is well adapted for its sustenance.

over from the previous year. The foreign indebtedness incurred in various loans somewhat exceeds \$34,000,000, but is nearly all funded through the Rothschilds at 4½ per cent. interest. The Chilians are importing relatively increasing quantities from the United States of our staple manufactures.

Steam Generator for Stock Raisers.

It has been demonstrated to the satisfaction of intelligent stock raisers that food, when cooked, is more economical and will give much better results than an even greater amount of uncooked food.



STEAM GENERATOR FOR STOCK RAISERS, MADE BY MESSRS. GOULDS & AUSTIN, CHICAGO, ILL.

6. That a blast furnace well located could command a trade which would allow of a very satisfactory profit on its output, with no immediate fear of damaging competition from other sources.

7. That supplies of mineral fuel suitable for iron manufacturing can be brought to the district so as to encourage other industries.

The enterprising little republic of Chili, with its population of only about 3,000,000, is making astonishing progress. The last report of the Chilean Secretary of the Treasury shows that during the last ten years the revenues and foreign trade of the country have more than doubled. The Government, which in 1866 could count upon little more than \$9,000,000, and in 1877 upon an income of a little under \$17,000,000, now estimates an income for 1888 amounting to \$36,000,000, to which is added a surplus of \$8,000,000 carried

When cooked, the food is more easily assimilated, but when fed raw a large proportion is not acted upon by the gastric juice of the stomach. The accompanying illustration, showing what is known as the Austin Steam Generator, will therefore prove of interest. It is primarily intended for cooking feed and heating water for stock, but it can be used also for boiling water for slaughtering, heating water for the bathroom, boiling water for the laundry, for canning and drying fruit, renovating feathers, and many other purposes of a similar character. The fire is completely surrounded by water, the water spaces on the sides and end of the steamer measuring 2½ inches. The boiler is provided with test cocks, a safety valve and a blow-off cock. The latter is placed at the lowest water point, permitting the blowing off of all sediment. The boiler will burn wood, coal or cobs. The fur-

nace door is large, and the fire easily started and maintained. A return flue is provided.

The capacity of the generator is ten pails of water, and it is claimed that steam can be raised in 15 minutes. It is made by Messrs. Goulds & Austin, 167 and 169 Lake street, Chicago, Ill., heavy material being used, and all seams being securely riveted with as much care as is used in the manufacture of regular type of steam boiler.

Trade and Presidential Elections.

Many people, says the New York *Journal of Commerce*, are puzzled to understand why the year of the presidential election should be a dull year for general trade. They argue that it takes as much food to support life one year as another; they insist that clothes wear out as fast during these 12 months as in any other; that houses built in the quadrennial year last as long as if erected at any other period—in short, that the prevalent indisposition to engage as actively in buying and selling and building during the progress of this political canvass is totally unreasonable. They hold that if people only thought so, the trade might be as active at the height of the campaign as if no such contest was taking place.

They hit it exactly in saying that trade might now be as active as at this date last year "if people only thought so," but it is the thought that makes all the difference. There is no more potent factor in the business world than the prevalent impression concerning the prospects of trade. If the retailer thinks there will be a large demand for goods he will order a larger stock, and the jobber will contract for more liberal supplies with the manufacturer and the importer, and this creates an active season, but it sometimes happens that the retailer is mistaken, and his increased purchases remain on his hands. He thought there would be a large demand for distribution, and he finds himself mistaken, and his groaning shelves and well-packed storehouses testify against him. To make it certain the movement must originate further back than the dealer. The moment that the mass of the people think that the time has come to buy the activity begins in good earnest. The duller intellect will agree that if there is to be a rush of business those who buy earliest will buy cheapest and have the best selections. This sets the wheels in motion and as far onward as the connection is maintained the activity is sure to be felt.

It is difficult, perhaps, to say exactly how the idea that the year of the election is not a good year for business gained ascendancy at the first, although we may without any great stretch of imagination trace it to purely natural causes. During a very exciting political contest those most deeply interested would, by force of circumstances, do less buying in the market. The busy politician would have less time to give to repairing his house, or replenishing his wardrobe, or restocking his stable, or attending to the score of other things calling for the expenditure of money. Then, not a few are hopeful that in some way their fortunes will be bettered by the result of the election, and they postpone their outlay for this reason. But the fact that so many people have something else to think about, and that, too, upon a topic quite absorbing in its character, will naturally divert their minds from projects little or great which involve the opening of the purse.

Dealers are very quick to observe such change, and they have come to see that when the public mind is thus occupied the stock of goods does not go off as freely, and by a wise forethought they give smaller orders in anticipation of such

a result. Let there be a common apprehension of some impending calamity, as of a coming pestilence, or a drouth, or an army of caterpillars, and the volume of trade, however active it has been up to that time, shrivels in amount. It is only a thought; no one has the cholera or the scarlet fever; no fields have been dried up or scorched, or devastated, but the dread of it paralyzes the movements of trade.

Midsummer Iron and Steel Statistics.

DECREASED PRODUCTION OF PIG IRON, BESSEMER STEEL, AND STEEL RAILS IN THE FIRST HALF OF 1888.

The American Iron and Steel Association have received from the manufacturers complete statistics of the production of pig iron, Bessemer steel ingots and Bessemer steel rails in the United States in the first six months of the present year; also complete statistics of the stocks of unsold pig iron in the hands of manufacturers or their agents on the 30th day of June last.

PIG IRON.

The total production of pig iron in the United States in the first six months of 1888 amounted to 3,382,503 net tons of 2000 pounds, or 3,020,092 gross tons of 2240 pounds. Our production in the last six months of 1887 was 3,771,996 net tons, or 3,367,853 gross tons. The production in the first half of 1888 was 347,761 gross tons less than in the second half of 1887, but it was only 29,203 gross tons less than in the first half of 1887. The production in the last five half years has been as follows, in both net and gross tons.

Production.	Net tons.	Gross tons.
First half of 1886.....	2,954,200	2,637,687
Last half of 1886.....	3,411,119	3,045,642
First half of 1887.....	3,415,210	3,049,295
Last half of 1887.....	3,771,996	3,367,853
First half of 1888.....	3,382,503	3,020,092

Our decreased production in the first half of 1888 was wholly in Bessemer pig iron, as the following figures will show.

	Last half 1887.	First half 1888.
Gross tons.		
Total production.....	3,367,853	3,020,092
Bessemer Pig iron.....	1,561,061	1,178,508

Foundry & mill pig iron.....1,806,792 1,841,584

These figures show that the production of foundry and mill pig iron in the first half of this year was slightly in excess of the last half of 1887. But the decrease in Bessemer pig iron was very great.

All the important Northern and Western pig iron producing States show a decreased production of pig iron in the first half of this year as compared with the last half of last year, except Ohio, whose production in the last six months was the highest attained in the history of the State in a similar period of time. The production of pig iron by the nine Southern States of Alabama, Tennessee, Virginia, West Virginia, Kentucky, Georgia, Maryland, Texas and North Carolina in the first half of 1888 was 433,796 gross tons, against 432,330 gross tons in the last half of 1887.

Our production of pig iron in the first half of 1888 was divided among the fuels used as follows, in comparison with similar details for the last half of 1887:

	Last half of 1887.	First half of 1888.
Fuel used—gross tons.		
Bituminous.....	2,071,933	1,885,539
Mixed anthracite and coke.....	868,920	789,874
Anthracite alone.....	146,201	96,252
Charcoal.....	281,030	248,427
Total.....	3,367,853	3,020,092

The very small quantity of pig iron which is now made in this country with anthracite coal unmixed with any other fuel is a remarkable fact. As late as 1871 we made more pig iron with anthracite coal than with all other fuels combined.

The stocks of pig iron which were unsold in the hands of manufacturers or their agents on the 30th of June last, and which were not intended for the consumption of the manufacturers, amounted to 358,273 gross tons, against 301,913 gross tons on the 31st of December last, an increase of 56,360 gross tons in six months.

BESSEMER STEEL INGOTS AND RAILS.

The production of Bessemer steel ingots in the United States in the first half of 1888, including 36,070 net tons of Clapp-Griffiths ingots, was 1,384,288 net tons, or 1,235,971 gross tons, against 1,650,785 net tons, or 1,473,915 gross tons, in the last half of 1887, a decrease of 237,944 gross tons.

The production of Bessemer steel rails in the first half of 1888 was 775,261 net tons, or 692,197 gross tons, against 1,146,117 net tons, or 1,023,320 gross tons in the last half of 1887, showing a decrease of 331,123 gross tons. These figures do not include a few thousand tons of Bessemer steel rails rolled in each period in iron rolling mills from purchased blooms. The production of Bessemer steel rails in the first half of 1888 was reduced much more than that of ingots, indicating an increased use of Bessemer steel thus far this year for miscellaneous purposes of nearly 100,000 gross tons over the last half of 1887.

The Cost of Rolling Wire Rods.

In response to a number of inquiries we present below the figures given in an affidavit made by William M. Douglass, who was for four and a half years superintendent of the steel mill of the Gautier Steel Company, Limited, and the Gautier steel department of the Cambria Iron Company, at Johnstown, and for two years superintendent of the Hartman Steel Company, Limited, at Beaver Falls, having charge of wire-rod mills of various kinds during that time. The statement of the cost of manufacture of 1 ton of 2240 pounds of No. 6 wire rods attached to this affidavit is based on actual wage rates and costs two years ago, except the price of billets, which is the present rate. The number of hands named is that of one turn and covers all labor required to place billets aboard the car and deliver rods on the car and to handle all scrap and other waste:

Cost No. 6 Wire Rods (Per Ton 2240 Pounds).	
Labor (other sheet).....	\$3.109
Fuel (gas).....	.550
Repairs.....	.800
Rolls, turning, &c.....	.350
Oil, waste and supplies.....	.400
Stock, 2380 pounds, at \$28.50.....	\$30.28
Scale, 100 pounds, at —.....	.00
Scrap, 40 pounds, at \$17.....	.30
	29.980
General expenses.....	\$0.250
Superintendent.....	.120
Royalty.....	.100
Interest.....	.250
Other expenses.....	.100
	36.009

Wages Rod Mill.	
Mills per gross tons.	Mills per gross ton.
1 roller.....	.330
1 assistant roller.....	.162
1 rougher.....	.088
1 rougher.....	.104
1 catcher.....	.077
1 hook.....	.060
1 bender.....	.102
1 bender.....	.106
1 bender.....	.110
1 finisher.....	.112
1 hook.....	.066
1 hook.....	.060
1 hook.....	.042
1 lead out.....	.044
1 pick up.....	.166
1 hook.....	.044
1 reel.....	.062
1 take off reel.....	.060
1 heater.....	.175
1 helper.....	.175
1 heater.....	.075
1 helper.....	.075
1 telegraph.....	.070
1 telegraph.....	.070
1 engineer.....	.065
1 engineer.....	.060
1 oiler.....	.040
1 stocker.....	.053
1 stocker helper.....	.043
1 bundler.....	.045
1 bundler.....	.045
1 bundler.....	.045
1 pull back.....	.050
1 fireman.....	.062
1 weighmaster.....	.045
1 Shearman.....	.045
3 laborers, at .032 each.....	.096
3 laborers, at .0266 each.....	.080

It is fair to state, however, in connection with these figures, that Mr. George

T. Oliver, during the hearing, announced that the chairman of the Hartman Steel Company, then present, authorized him to say that the figures given are not correct, and that he would furnish the committee with the actual figures of cost of manufacturing by that company. Mr. William R. Stirling, treasurer of the Joliet Steel Company, made the point that the relation of duty to the cost of labor in finishing is deceptive. We not only require protection to cover the increased cost of labor in this country, as compared with the cost of labor abroad, but we also desire protection to cover the increased cost of supplies, coal and a good many other items entering into it.

The Modifications in the Wages Scale.

In the scales formulated in convention by the Amalgamated Association were a number of conditions and extras not contained in the scales that expired on June 30 last. Failing to agree in conference—in fact, failing to consider any portion of the proposition submitted to the manufacturers' Conference Committee—the first actual consideration of the proposition submitted by the Amalgamated Association was had with Mr. D. B. Oliver, of and for the firm of Oliver Bros. & Phillips, in the general office of the Amalgamated Association, after failing to agree in the general conference. At the Oliver conference, after nearly 12 hours' discussion, certain concessions were granted on the part of the Amalgamated Association committee. These concessions were of course granted to all who previously and subsequently signed the scale. The next modification obtained was by Jones & Laughlins, which has also been granted to all other firms. These changes were made prior to the printing of the scales in book form, and were as follows:

The roll turners' scale was stricken out entirely. In the memorandum of agreement the following was also stricken out:

"4. That for all crop ends on finishing mills used for merchantable purposes the same shall be paid for."

In the boilers' scale the last clause was eliminated—namely:

"10. One dollar per ton extra for boiling in furnaces where four puddlers and their helpers work on the same standing."

In the guide mill scale, under the head of "angles," the following changes were made: $1\frac{1}{2}$ by $\frac{3}{4}$, from \$4.10 to \$3.20; $1\frac{1}{2}$ by $\frac{3}{4}$, from \$4.10 to \$3.65.

It was also discovered that the figures \$2.03, that should have appeared opposite the $2\frac{1}{2}$ card rate in the scale for scraping and busheling, had been omitted.

As above intimated, these concessions, changes and errors were allowed, made and corrected prior to the printing of the scales in book form. The scales were then gotten out and distributed to sub-lodges.

Since then (last Monday) the following has been granted on the hoop mill scale—note No. 9 on page 14:

"9. All hoops $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$ and $\frac{7}{8}$ inch lighter than No. 32, 10 per cent. extra on above prices."

This last concession (an addition to last year's scale) will also apply to all mills making such product.

The citizens of Dunbar, Fayette County, Pa., have formed an association, entitled the Dunbar Improvement Association, and have issued a small pamphlet reviewing the history of that well-known iron manufacturing town, and calling attention to its special advantages, among which are proximity to the famous Connellsville coke district and the local iron ore deposits, the supply of natural gas, glass sand, fire-clay and other raw materials.

A Farewell to Midvale.

During the past month Mr. R. W. Davenport, who has been connected with the Midvale Steel Company for 14 years, resigned his position as manager to accept the charge of the Bethlehem gun foundry, now building. The occasion was seized by the employees of the Midvale Steel Company to express to their chief their appreciation of his work and their kindly feelings by presenting him with a gold watch and a gold charm, a miniature of the first all-steel gun made in the United States. The presentation speech was appropriately made by J. K. Griffith, superintendent of the melting department.

Mr. Davenport in his reply reviewed the history of the struggles of the Midvale Company to attain the recognized position it now occupies. He said:

It was 14 years ago last May, in 1874, that I came into the laboratory at Midvale, a rather fresh and green looking young man, I fancy, as some of you may remember. The works had just then passed through a crisis which had come near being fatal, and life was being brought back under the direction of Mr. Middleton, as superintendent, and Mr. Brinley, as his assistant in charge of the laboratory and the steel making. The works had been brought into this low condition by the grossest carelessness, if not ignorance, in the direction of the details of manufacture. Good and willing men were not lacking, the bone and sinew had been there, practical skill in melting, heating and working steel had been there, and there had only been needed, to make the enterprise a success, a more accurate chemical knowledge of the difference between good and bad steel and a common sense and conscientious application of it in the direction of the work. These requirements were well filled by Mr. Middleton and Mr. Brinley, and they took hold of the work in such a way as to make every true man trust and respect them. It was no easy task; the reputation of the works for producing good material was absolutely gone. Something like 3000 tons of steel of various kinds and in various conditions of manufacture were piled about the yard regarding which little or nothing was known. The only stock record book in existence was in the brain of old Miky Kelley, and to him Mr. Brinley would go for information, such as it was. The question of assorting this mass of material and determining its usefulness had to be solved by the laboratory, and it was to help in this work that I came to the works. By careful selection and mixing with high grade pig irons, purchased for the purpose, all this old stuff was successfully worked into rail blooms for which we got over \$100 per ton (the present selling price of rails is below \$30). This contract for rail blooms was with the Reading Road, and had been nearly cancelled on account of the former management of the works trying to use old ingot molds in making the steel, and thereby putting in so much phosphorus as to cause the rails to break in unloading. In the autumn of 1874 a very sad thing happened Mr. Middleton. Run down by overwork and anxiety, he was taken with typhoid fever, and after a most painful illness died in November. Mr. Brinley was now made superintendent, and I came from the laboratory to be his assistant. At this time there were less than 75 men employed at the works. One small open-hearth furnace was in operation; No. 1 hammer ran a few days a week; some tool steel was melted in the crucibles and hammered at old No. 3 hammer. Something had to be done to increase the product of the works. The Pennsylvania Railroad was then purchasing axles, rough turned all over, for its passenger service from England, and paying 13½ cents per pound for them. They were guaranteed to stand a very severe

test, and no one had made them in this country. The officials of the road scarcely cared to give us an order, but we finally took an order for 100 axles and went to work. Pete McNally will remember how carefully we considered the subject and analyzed a piece of an English axle; how many trial heats we melted, and how anxiously we watched the result of the drop test, shivering in the cold those winter days. Finally we succeeded, and have since made many thousand of these axles for the Pennsylvania Road, and have been selling them for several years past for about 4½ cents per pound, which speaks well, I think, for the ability of our English cousins to charge a big price when they think they can get it, and for the effect of home competition in reducing price notwithstanding a protective tariff.

We next turned our attention to tires. As already said, the tin mill had been shut down; the tires had become so bad that they could not be sold. We believed that a first-rate tire could be made in the open-hearth furnace and went to work to do it. P. Conner will remember the first open-hearth tire ingot made in this country and sent to the forge to be punched and beaked. He looked at it very suspiciously, but it did not bite him and it did hammer very well. The manufacture of open-hearth tires soon ceased to be an experiment, and the works have since sold over 125,000 of them. In the meanwhile additional hammers and rolls were put in and the production of miscellaneous forgings, tool and spring steel, &c., constantly increased. Then came the first call from the Navy and Army for steel for built-up guns. We grappled with the subject with great doubts of our success; the tests demanded were very severe and our facilities very limited, but Mr. Brinley's careful, scientific mind directed our first efforts and we obtained promising results from the start. The development of this work has, I think, been a great advantage to the works and most instructive to all concerned. Up to the present date no other works in the country has supplied the Government with any large amounts of ordnance material. And now I have referred to a few things which we have accomplished at Midvale during all these pleasant years of work. We might have done more, but I don't think that we need be ashamed of our record; but, my friends, the fact that gives me more pleasure and satisfaction than any I have mentioned to you is that during all these 14 years, first under the direction of Mr. Brinley and then, since 1882, under my direction, we have never had a serious disagreement and work has never been stopped by a strike. And what has been the cause of this most desirable condition of affairs? It is, I think, chiefly because we have been able to trust one another. You have been led by comparatively young men, who have brought from the schools knowledge learned from books and the laboratory. They have come among you (and I do not speak now of myself alone, but also of the corps of able assistants with whom I have had the pleasure of working), not with an overbearing importance of the theoretical knowledge they had acquired, but with a high appreciation of the practical knowledge and skill acquired by you in years of hard work and with a desire to learn from you and give what they could in exchange. They have tried, I think, not to take undue advantage of the power accompanying their position, and not to make promises that they could not carry out. They have endeavored to know you personally; to meet you as man to man; to make you trust them, and their efforts have not failed.

The Director of Public Works, in Philadelphia, has awarded contracts for a gas-holder tank to Erskine D. Smith for

\$59,420.70; gas-holder to Morris, Tasker & Co. for \$46,820, and a 14-foot station meter to Helme & McIlhenny for \$4500. Contracts for iron pipe were awarded to the Donaldson Iron Company at the Gloucester and Camden Iron Works, and for pig lead to James C. Burton.

Test of Fireproof Wire Lathing.

A special train from Broad street station, last Wednesday, took out to Germantown Junction a large number of architects, builders, insurance men, and parties connected with the iron and steel trade, to witness a comparative test of the durability under fire of the ordinary wooden lathing, now generally used, and the fireproof patent stiffened wire lathing of the New Jersey Wire Cloth Company. A substantial two-story brick structure, about 8 by 12 feet in size, had been erected, with a stout dividing wall in the center, making two compartments. One apartment had its ceiling of wooden laths, nailed to joists and plastered over, and the other of wire cloth, upon which the plaster had been spread. A hot fire was built in each compartment after everybody interested had an opportunity to inspect the preparations by going up a ladder to the top of the structure, upon which no roof had been placed, the better to subsequently compare results. At the end of ten minutes, when the fire was extinguished, the wooden lathing had burned away, the plaster had fallen into the ashes beneath, and the joists became charred from the flames. In the other compartment, where the wire cloth was used, it and the plaster remained intact at the end of that time, as it did over an hour afterward, when the fire there had been allowed to burn out. The test seemed to meet the general approval of the spectators, who commended the use of the wire lathing in buildings intended to be fireproof, or, at least, slow burning.

Pittsburgh Pig Lead Freight.—The Pittsburgh and Lake Erie Railroad and its connections have made the following rates on pig lead in carloads, 24,000 pounds and over from Pittsburgh to the following named points: Rochester, 10½; Syracuse, 11½; Utica, 11½; Albany, 13½; New York, 13½; Boston, 18; Portland, 22½. The new rates went into effect on Wednesday the 25th ult.

The Detroit Dry Dock Company, of Detroit, Mich., have just commenced the construction of four large steamships, to be completed for next season's business. Two will be duplicates of the J. Emory Owen, and will be built of wood. The others will be composite, having iron frames and plating above water and plank below, similar to the Fayette Brown, but larger. The composite part will be 296 feet long, and will be built at the Wyandotte yard.

The Southern Railway and Steamship Association have issued a rate-sheet on pig iron, which went into effect on the 1st ult., making the rate to Cincinnati \$2.75 from Birmingham, \$2.25 from Chattanooga and \$2.50 from Sheffield and Florence, Ala., while the rates to Louisville are \$2.50 from Birmingham and \$2.25 from Chattanooga, Florence and Sheffield.

Contracts for furnishing steel for the armored battle ship Texas, to be built at Norfolk, Va., have been awarded as follows: Park Brothers & Co., of Pittsburgh, 920 tons of steel plates, \$66,770; Carnegie, Phipps & Co., of Pittsburgh, 503 tons of steel shapes, \$43,266, and 100 tons of rivets, \$8601; and the Standard Steel Casting Company, of Thurlow, Pa., 120 tons of steel castings, \$41,664.

THE WEEK.

The immense docks of Montgomery, Champaign & Co., at Lakeside, Mich., were destroyed by fire, together with 1,500,000 feet of lumber; loss, \$175,000.

During the month of June there were exported from the port of New York 21,831 packages of American agricultural implements, the total value of which was \$398,188; 245 cases of firearms, valued at \$36,660; 492 cases of tacks, valued at \$3887; 4498 kegs, 1216 cases, 28 boxes and 70 packages of nails, valued in all at \$20,826; and 1508 cases of American made cutlery, worth \$30,386.

The aggregate of Government receipts from the sale of public lands was greater last year than ever before. The sales amounted to about \$11,000,000, compared to \$9,000,000 for the previous year and \$5,000,000 for each of two years preceding.

The improvement of New York harbor is spoken of in detail by Engineer McFarland, U. S. A., in his annual report. The project for the improvement of Gedney's Channel, he says, provides for dredging a channel 1000 feet wide and 30 feet deep at mean low water, from deep water below the Narrows, through the main ship channel and Gedney's Channel to deep water outside the bar. To maintain this channel will require either periodical dredging or a contraction of the entrance by the construction of a dike running across the shoals from the Coney Island side, with suitable protection for the head of Sandy Hook to prevent its being scoured away by the increased current. The estimated cost of obtaining the dredged channel is \$1,490,000, and the entire cost of the improvement, should the contraction work prove to be necessary, is estimated at between \$5,000,000 and \$6,000,000. The dredging done during the last fiscal year, Colonel McFarland says, has resulted in producing a channel of good navigable width across the bar 25 feet deep at mean low water, but, he adds, it resulted in no practical benefit to navigation, since no increase of depth was obtained on the shoals inside the bar. The work on the Gedney's Channel division will be completed within the contract time, but the main ship channel cannot possibly be cleared by December 1, 1888, at which date the contract expires. The amount needed outside of the present appropriation to widen these channels to 1000 feet and to deepen them to 30 feet is \$540,000. The speedy removal of Flood Rock is a necessity, and \$500,000 could be expended advantageously during the next fiscal year.

A correspondent at Pittsburgh refers to reports gathered from Knights of Labor prominent in the order, that the membership in that organization to-day does not exceed 150,000. In the Pittsburgh district, for example, the members have declined within the year from 11,500 to a trifle over 4000, and the famous district No. 49 of New York, has decreased from 81,000 to 10,000. Apathy, according to this authority, has caused the difference.

Three members of the firm of W. G. Price & Co., manufacturers of iron, lead and shot, of Pittsburgh, are seeking a new site somewhere near McKeesport. The firm desires to rebuild its works and the shot tower so as to double the capacity and employ not less than 100 men at the start, but cannot do it on the old location, as it is hemmed in by other works.

The American Paper Makers' Convention at Saratoga last week elected E. C. Rogers, of Holyoke, Mass., president for the coming year. It was stated by the retiring president, Byron Weston, that profits during the past year were less than

ever before. Warner Miller opposed putting alum on the free list. One of the reports stated that 300 tons of manila paper are made daily. They had tried during the year to restrict the business, but failed. Over 12,000,000 pounds of wood board had been made last year.

The Suburban Elevated Railroad is advancing along the upper part of Third avenue at the rate of 200 feet a day.

In a recent speech Mr. Vest, of Missouri, said: "The railroads have abolished river navigation, just as much as civilization has abolished the Indians as an autonomy in this country. The poor, straggling steamboat men who I see around this capitol now remind me of the last remnants of an extinct race, the melancholy historical remains of a former era. It is inevitable, and you cannot help it. * * * The old-time glory of the steamboat has gone like that of Tecumseh and the great Indian chiefs, never more to be seen in this country."

Four anarchist dynamiters have been indicted by the grand jury in Chicago. Seric, the gunsmith, seems to have been an efficient co-worker in the manufacture of the deadly bomb.

The Guatemala Central Railroad, extending from San José, on the Pacific Coast, 71 miles in a northeasterly direction to the Capital, has become one of the most successful enterprises in which citizens of the United States have engaged in Central America. The total cost, including short branches, was \$2,500,000, and the net earnings in 1887 were \$211,606. The rolling stock comprises nine locomotives from the United States.

Jay O. Moss has been elected president of the Hocking Coal and Iron Board, Ohio.

The Senate passed the Army Appropriation bill, including the Hawley amendment appropriating \$750,000 for a gun factory at Watervliet, N. Y., \$5,000,000 for the purchase of steel for heavy ordnance guns, \$500,000 for the purchase of submarine mines and \$100,000 for submarine controllable torpedoes. The Fortifications bill, as completed by the House Committee, provides for an ultimate expenditure of \$15,000,000, of which \$6,200,000 is to be appropriated this year. A board of army officers and civilians is authorized to be appointed by the President to contract with gun-makers for the supply of 12, 14 and 16 inch steel rifles, not less than 50 in number, and at an expenditure not exceeding \$2,500,000 annually. The bill also provides for the purchase of 50 cast-iron mortars and 20 12-inch iron rifles.

Traffic arrangements for the use of the Poughkeepsie Bridge have been completed with nearly all the railroads, preparatory to the opening for business, a few days hence.

There are 51 cases for violation of the Contract Labor law in Massachusetts on file at the District Attorney's office, all of which will come up for trial at the October Term of the United States Circuit Court. Of these about 40 are against the owners of fishing schooners, who hired men in Nova Scotia and brought them to sail from Gloucester and other fishing ports. The others are all against farmers, who hired help in the provinces and brought them to Massachusetts to perform agricultural labor. There are no cases pending against the factories.

The spread of New York City in the direction of Westchester County, across the Harlem River, is uninterrupted. The Suburban Elevated Road will be in operation to Fordham next winter, a distance of nearly 5 miles from the Harlem at Second avenue. The New York and Northern Railroad runs through the west side of the district to Yonkers and will open

stations for way traffic as fast as needed. Perhaps the greatest improvement in the district is the sinking of the tracks of the Harlem Railroad, now nearly half done. The Manhattan Bridge, over the Harlem River, is now being finished. When the Harlem road has sunk its tracks a tunnel is to be built in place of the present railroad bridge. Another tunnel under the river at McComb's Dam Bridge for general traffic will be commenced soon. With the completion of the Harlem River Canal in the next two years most of these improvements will be finished.

A feature in the Congressional inquiry into the subject of immigration, now being prosecuted in this city, is the testimony of Alexander Monaco, the Italian Vice Consul. A large proportion of the Italian immigrants, he said, were farmers or farm laborers, but they were generally without the means to get further than New York. Contractors and others send to their friends in Italy and tell them to send over men and pay their passage, which was \$24 each. The immigrants are sent to certain people in this city, who place them at work, generally at from \$1 to \$1.25 a day. They are then required to pay back to their employers on this side the price of their passage and a liberal interest therefor. The amount the immigrants have to pay is sometimes as high as \$50, and the advance on the ticket is never less than \$5. Sometimes the bosses or contractors default after receiving the emigrants' wages, and leave them in the lurch. The contractors also act as ticket agents of the steamship companies.

Mayor Hewitt wants the Senate Aqueduct Committee to proceed with its investigation, as the new commission will be called upon to decide questions affecting not only the construction of the work but the compensation to be paid to the contractors.

Capt. John Ericsson entered upon his 86th year on Tuesday, July 31.

The contract for the great Soo water-power canal at Sault Ste. Marie, was awarded to Macarthur Bros., of Chicago, for about \$250,000. Work will commence August 1, when 1000 men will be put on the immense undertaking. The canal will be three miles long, with a capacity of 800,000 horse-power. This, it is believed by the promoters, will make the Soo the great milling center of the Northwest.

Bids for ironwork on the new public building in Brooklyn were opened in Washington on Monday. Among them were J. H. O'Rourke, \$230,000; E. F. Gable, \$149,388; K. A. Murphy, \$250,000; E. P. Wright & Co., \$229,662.

Lieut.-Col. W. E. Merrill, in charge of the Ohio River improvements, recommends that the plans in successful operation at the Doris Island dam, below Pittsburgh, be applied on a more extended scale, and he proposes two or more movable dams to cost \$1,000,000.

Consul-General Raine, at Berlin, says that in his opinion it would be highly advantageous for American manufacturers and exporters to combine and open a permanent exhibition of American specialties at Berlin. He believes that this would influence many important trade connections, for the reason that the influx of foreign visitors at Berlin is attracting thousands of people. Only the best of our industrial products should be exhibited. As a condition precedent the ground should be carefully gone over by persons having at least a fair degree of familiarity with foreign languages and knowledge of the wants and customs of prospective purchasers. As an example of what may be done by making foreigners acquainted with our goods, a case may be cited in which inquiries were received by cable

from Japan for the purchase of paper making machinery in England. Fortunately the dispatch fell into the hands of a gentleman who knew the superiority of the American plant, and the result was that the Japanese delegation came to the United States instead of going to England, and determined to purchase two complete plants for paper making, together with the necessary power, the order reaching in all the sum of \$250,000.

One of the works of greatest magnitude at present under way at the Brooklyn Navy Yard is the digging of the new dry-dock, contracted for by J. E. Simpson & Co., of New York. Some idea may be formed of the immense amount of timber required for its construction from the statement that it will take about 3,000,000 feet—or, in other words, equal to that contained in the wonderful timber raft coming here from Joggins, Nova Scotia, to complete the work.

In France, a new cruiser, known as the *Cecille*, has recently been launched, which is to be armed with six 5-ton and ten 3-ton guns, and is expected to make between 19 and 20 knots. This is one of 15 vessels of this class to be built there. Russia has planned three of a similar class, of which one will soon be afloat, and England recently launched one of five recently ordered. The five American cruisers now building will rank about the same as to size and speed.

There are invested in Michigan in saw mills and other machinery in the lumber business \$40,000,000, employing 28,000 men.

Fruit growers in California fear they will be unable to gather their crops this year, on account of the scarcity of labor since Chinese restriction has been enforced.

P. T. Barnum celebrated his 78th birthday by giving a building and lot to the Bridgeport Scientific Society at a cost of \$200,000.

Brazilian planters who lost their slaves through the emancipation bill are now clamorous for compensation. The Government idea had been to furnish money to the planters upon mortgage of the growing crops, and to supply this resource through a bank, but the Bank of Brazil demanded favors which the Government was unwilling to concede. The planters, however, are unanimous in the demand, not for temporary assistance, for which they would have to pay high interest, but for compensation for the property of which they were suddenly deprived.

With the lessened demand for iron, a possible shortage in the wheat crop and a largely increased tonnage seeking employment, the season of navigation on the lakes is not promising, and business at all the lake ports is much depressed.

There were five bidders for steel for use in construction of the United States armored battle ship *Texas*, to be built at Norfolk, the lowest being as follows: For 920 tons of steel plates, Park Brothers & Co., of Pittsburgh, \$73,983; for 503 tons steel shapes, Carnegie, Phipps & Co., of Pittsburgh, \$43,266; 100 tons of steel rivets, Carnegie, Phipps & Co., \$8602; 120 tons of steel castings, no bidders.

A new steam canal boat, the *World*, built by G. W. Hall, of Lockport, N. Y., is 96 feet in length, with a single-screw propeller and consumes $1\frac{1}{2}$ tons of coal per day. She easily made her first trip with a load from Buffalo to New York in six days. She cost \$7000.

The harbor of Yokohama is to be improved at a cost of \$1,700,000.

A contract for the building of the new paint shop of the Pennsylvania Railroad

Company, in Altoona, Pa., has been awarded to Hoover & Hughes, of Phillipsburg. The contract price is \$137,000.

Z. Taylor & Co.'s iron foundry, in Brooklyn, was damaged by fire to the extent of \$8000.

The best record yet made by first-class steamers, the *Umbria* and *Etruria*, stands at six days and two hours. It is expected that the City of New York and City of Paris, will outdistance her achievements. She was tested in many ways, but she was only tried for speed at short intervals and each time she sped through the water at the rate of 23 miles an hour.

An examination of the official time tables for June, made by the *Railroad Engineering Journal*, shows that the fastest trains now scheduled are two on the Baltimore and Ohio, which are timed to run the 40 miles from Baltimore to Washington in 45 minutes without stops, making the rate of speed $53\frac{2}{3}$ miles an hour. No other train can be found which makes over 40 miles an hour.

The salmon pack of the Columbia River this season will be about 300,000 cases, and will net about \$1,950,000.

Findlay, Ohio, in utilizing its gas supply, made arrangements by which the town furnished fuel gas to factories without any charge whatever. The result is that it built 2700 new houses last year.

The report of the Commissioner of Labor, Carroll D. Wright, upon the strikes and lockouts of the past six years, which has just been issued, gives some interesting statistics concerning labor troubles in the State of New York. Since 1881 there have been 9247 strikes ordered in the State, 8716 of them by labor organizations. These strikes involved 9247 establishments, 4717 of which were closed for an average period of 15 days. Of the total number of strikes 4720 succeeded, 753 partly succeeded and 3759 failed. The total loss to employees aggregated \$8,581,784, and that of employers \$5,966,421. The sum of \$726,696 was raised by labor organizations to aid the strikers. In these strikes 376,584 employees were involved, and the places of 24,889 strikers were taken by new employees, of whom 4581 were brought from other places. One thousand five hundred and twenty-eight lockouts were ordered in the same period, closing an equal number of establishments an average period of 22 days. Of these 180 only succeeded, 137 were partly successful and 1090 failed entirely. The loss to employees was \$3,150,123; to employers, \$845,262, and \$392,316 was raised to support the locked-out employees. Of the total number of strikes occurring during this period 3416 were owing to demands for increased wages, while 2997 were for a reduction in the hours of labor. Of this latter number 1752 occurred in the tobacco trade alone.

A statement from the United States Consul at Hamburg shows that the exports from that district during the year ended June 30 amounted to \$5,936,535, which is a decrease of \$208,612 compared with the previous year. Metal, metal goods and hardware were included to the amount of \$61,545; zinc and spelter, \$13,610.

The Secretary of the Treasury recently submitted to the Attorney-General for an opinion the question whether the term "forgings of iron and steel," as used in the tariff act in the provision for "forgings of iron and steel for vessels, steam engines and locomotives, or parts thereof, weighing each 25 pounds or more," covers only forgings of the two metals combined, or both forgings of iron and forgings of steel. The Attorney-General gave it as his opinion that the term applied to both forgings of iron and forgings of steel, and

not alone to those forgings in which the two metals are combined. The Treasury Department has accepted this interpretation, and customs officers have been instructed accordingly.

The substitution of Belgian blocks for cobble stone in the streets of Philadelphia is the subject of a special message from the Mayor, who has come to an agreement with the street-car companies regarding co-operation in the work, the basis, it is said, being that the city shall pay \$1.50 per square yard of Belgian block and the companies about \$1. It is estimated that a mile of a Philadelphia street of ordinary width can be paved with granite blocks for \$40,000. On this estimate 17 miles of streets could be paved with the \$300,000.

Contractors in Ottawa, Ontario, say the Government will shortly call for tenders for the construction of the Sault Ste. Marie Canal, but they doubt whether the contract will ever be awarded, as they think the proposal is only a scheme to frighten the United States in the event of an unsatisfactory settlement of the fishery question.

An oil shipping firm at Pittsburgh have entered suit against the Pennsylvania Railroad Company to recover \$150,000 damages under the Interstate commerce law, on account of a rebate of 13 cents per barrel allowed a competitor, the firm referred to having been discriminated against to this extent on more than 260,000 barrels, besides suffering in other respects.

Four tea-laden steamers running in connection with the Canadian Pacific Railway Line will deliver their cargoes at Vancouver this season. Of two cargoes that have already arrived the first consigned to New York, reached this city in 12 days from the Pacific Coast.

According to Congressman Dingley, of Maine, who has collected a vast amount of statistics relative to the paper interest of this country, especially his own State, wood, pulp and fiber is a product of no less than 21 States out of the 38. The capital employed in its manufacture amounts to \$25,000,000, the number of men employed in the mills being over 22,000.

Total immigration to the United States, save from Canada and Mexico, for the month of June was 68,475. For the same period in 1887 it was 65,384. Immigration for the year ended June 30, 1888, was 539,818, against 483,116 the previous year.

A new boycotting question has been decided by the Massachusetts Supreme Court. The *Lasters' Protective Union* caused several men carrying placards to walk up and down in front of a shop in which the employees were on a strike. The placards were intended to keep new men from taking the places of the strikers. The employers did not proceed against the offenders criminally or sue for damages, but appealed for an injunction to stop the placard business. The Supreme Court rules that it was a proper case for an injunction. It holds that the thing complained of was a nuisance detrimental to the interests of the employers, and, as such, one that ought to be abated by the court.

The *Leary log raft*, which is about to be towed from Nova Scotia to New York city, will cost, if successfully landed, as follows: The timbers cost, in Nova Scotia, \$13,000; the logs can be sold in New York for \$50,000. The timbers of the ship, if sawed on the Bay of Fundy, would require a fleet of 100 schooners to transport them to New York, or it would take 50 trains of 50 cars each to transport the lumber the same distance. There seems to be no doubt in the minds of tow-boat people in this city that the work of handling the raft will be successful.

MANUFACTURING.

Iron and Steel.

P. L. Kimberly & Co., Limited, proprietors of the Atlantic Iron Works, at Sharon, Pa., have signed the Amalgamated scale and operations were resumed in full on Wednesday, the 25th ult. On account of the retirement from the firm of Edward Roberts, William B. Roberts becomes general superintendent, L. A. Burrel assistant superintendent and R. D. Brown boss of the puddling department.

The Standard Iron Company, of Bridgeport, Ohio, have signed the scale and resumed operations. During the shut-down the firm made some very extensive improvements and additions to their plant, and in a few weeks the capacity for sheet iron will be almost doubled. They have built an addition 100 x 60 feet, in which are located two new sheet mills, built expressly for this company from plans furnished by Manager T. B. May. One is a specially heavy jobbing mill and the other is a mill built expressly to roll very thin sheets, to be used in the galvanizing mill. They have also built a galvanizing shop, with a capacity of 20 tons daily, and a plant in which coal gas can be made to supply the entire mill. This move is made necessary by the Wheeling Natural Gas Company refusing them gas at the old rate.

Cartwright, McCurdy & Co., operating the Enterprise Rolling Mill, at Youngstown, Ohio, and the Youngstown Rolling Mill Company, at the same place, have signed the Amalgamated scale and resumed work. The following note was eliminated from the agreement: "All hoops, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$ and 2 inch lighter than No. 22, 10 per cent. extra on above prices." This refers to the lightning-rod scale, and especially to these two mills. The same rule will be stricken off when Lindsay & McCutcheon and J. Painter & Sons, both of Pittsburgh, sign the scale.

The night turn in the converting mill of the Edgar Thomson Steel Works, at Braddock, Pa., on the evening of the 23d ult. made the largest output ever made in the same time since the works were built. Sixty-three heats were made, producing over 600 tons of steel. The run is said to never have been excelled by any steel firm in the country under similar conditions.

The Columbia Iron and Steel Company, of Uniontown, Pa., have signed the scale, and their plant is now being operated to its utmost capacity. The firm are manufacturers of steel structural shapes exclusively, and have sufficient orders on hand to keep them busy for the balance of the year.

On Thursday, the 23d ult., the Warren Rolling Mill, at Warren, Ohio, signed the Amalgamated scale, and operations were resumed in all departments on Monday, the 30th ult. Except for a few weeks last year this mill has been idle since 1883. Last year Alderdice, Bishop & Co. expended more than \$100,000 in repairing the plant, and, after a short run, failed. The creditors then secured Henry Wick to operate the mill for them, and \$20,000 more has been put in, making what iron men claim to be the best mill in the Mahoning or Shenango valleys. A patent process of heating the iron that discounts natural gas for cheapness has been attached to the building furnaces, and it is expected that, for the first time in the history of the mill, iron will be made with profit to the owners.

James P. Witherow, engineer and contractor, of Pittsburgh, has just closed a contract with the Chester Rolling Mills, of Thurlow, Pa., for the erection of a new Bessemer steel plant, to be run in connection with their rolling mill. They will operate two 3-ton vessels with blooming mills complete. These will have an output of 350 tons per day and will give employment to 400 men.

A. M. Byers & Co., of Pittsburgh, signed the scale last week, and their plant is now in full operation.

The Hartman Steel Company, Limited, of Beaver Falls, Pa., are placing several sets of shears in their works and will soon commence to shear steel plow shapes. This is a new departure for this firm.

Norway Furnace, at Pottstown, Pa., operated under lease by Gabel, Jones & Gabel, was blown out last week. On Monday, the 23d ult., a portion of the tunnel head fell in, which could not be repaired without a stoppage. The Philadelphia Coal and Iron Company, who own this furnace, are repairing the old hot blast, and will put in an additional one. All the repairs and improvements can be made and the furnace be ready to resume operations in about two months.

The Buckeye charcoal furnace, at River-ton, Jackson County, Ohio, has been sold to F. E. Hinkley, of Chicago, Ill.

The bulk of the contracts for furnishing steel for the battleship Texas, to be built at Norfolk, Va., awarded at Washington, D. C., on Wednesday, the 25th ult., has been given to Pittsburgh concerns. The following awards have been made: Park, Bro. & Co., Limited, 920 tons of steel plates, \$66,700; Carnegie, Phipps & Co., Limited, 503 tons of steel shapes, \$43,226, and 100 tons of rivets, \$8601. The Standard Steel Casting Company, of Thurlow, Pa., were awarded the contract for 120 tons of steel castings, for \$41,664.

The Cambria Iron Company, of Johnstown, Pa., are rebuilding their Conemaugh Furnace.

No. 2 stack of the Appleton Furnace Company, at Appleton, Wis., has been taken down, and it will not be rebuilt.

The Moorhead-McCleane Company, proprietors of the Soho Iron and Steel Works, of Pittsburgh, signed the Amalgamated scale last week, and operations were resumed in full on Monday, the 30th ultimo. The demand for a 10 per cent. reduction, which affected the Knights of Labor in the employ of the company, has been withdrawn.

Lucy Furnace, No. 1, of Carnegie, Phipps & Co., Limited, at Pittsburgh, will be blown out some time during the present month, for the purpose of being repaired. This furnace has produced over 150,000 tons of iron on the present lining, which is certainly a remarkable record.

Carnegie, Phipps & Co., at their lower Union Mills, Twenty-Ninth street, Pittsburgh, have completed a large iron building over the department where much of their shape iron is shipped. It affords great protection to the workmen and also gives plenty of room for the handling of a traveling crane.

Ella Furnace, of the Wheeler Furnace Company, at West Middlesex, Pa., has been blown out for the purpose of being relined and repaired. An improved hot blast is being erected, and a new 87-inch cylinder upright blowing engine will be placed in position, and take the place of the present engines.

The Etna charcoal furnace, at Etna, Polk County, Ga., which has been idle for over two years, is now being repaired, and is expected to be put in blast in October.

A special dispatch from Lebanon, Pa., under date of the 26th ult., reads as follows: "An application is to be made for

a charter of an intended corporation to be called the Lebanon Rolling Mills, the character and object to be the manufacture of iron or steel. The new corporation will absorb Light's Rolling Mill, and erect additional mills with improved facilities for the production of iron and steel."

A recent issue of the Sharpville (Pa.) Advertiser says: "In 1870 Sharpville had three blast-furnace plants, producing 4500 tons of pig iron per month, or 54,000 tons per year. This represented approximately about 250,000 tons of freight per year. At the present time there are six plants, producing, say, 16,000 tons of pig iron per month, or nearly 200,000 tons per year, representing 1,000,000 or more tons in freight. The materials come principally from Michigan, Minnesota, Wisconsin, Ohio and Western Pennsylvania and other States. Sharpville has increased in population from 800 in 1870 to nearly 3000 at the present time."

The Bellaire Nail Works, of Bellaire, Ohio, signed the steel scale last week, and will resume operations in the Bessemer department in a few days, repairs having been about completed.

The Trumbull Iron Company, of Girard, Ohio, signed the Amalgamated scale on Tuesday, the 23d ult., and the works of the company are now in full operation.

The Mahoning Valley Iron Company, of Youngstown, Ohio, signed the scale on Wednesday, the 24th ult., and operation were resumed in all departments the next day. The firm employs about 1200 men.

The Hartman Steel Company, Limited, of Beaver Falls, Pa., are averaging a product of over 100 tons of wire rods a day.

On Saturday, the 28th ult., Andrews Brothers & Co., proprietors of the Haselton Iron Works, at Haselton, Ohio, signed the Amalgamated scale. The puddling department has already resumed operations and the finishing departments will be started up as soon as repairs are completed. This leaves but one firm in the Mahoning Valley that has not signed—the Hubbard Iron Company, of Hubbard—and it is understood it will sign as soon as the machinery is in shape.

At the works of the Cleveland Rolling Mill Company, of Cleveland, Ohio, the Bessemer steel works, new steel works, big and small hammer works, old and new blooming mills, the three rod mills, rail, puddle and bar mills, foundry, blast furnace and the model shop, are all working full handed.

On Saturday, the 28th ult., the Pittsburgh Forge and Iron Company, of Pittsburgh, whose plant is located in Mahony City, Pa., signed the Amalgamated scale. Operations were resumed in all departments on the 30th ult.

The Missouri Furnace Company, of St. Louis, are completing repairs to Furnace No. 1. The same has been relined from top to bottom and only the smaller repairs remain to be finished.

At the annual meeting of the North Chicago Rolling Mill Company, held on the 25th ult., at the company's office, in the Rookery Building, Chicago, there were 54,644 shares of the stock represented out of 60,000 shares. The report for the year's business of the company, ending June 30, 1888, shows

Gross earnings of	\$13,549,486.64
Gross tons	
Volume of product	1,000,139
Raw material received	1,304,235
Pig metal made	347,795
Steel ingots	313,016
Steel rails	263,772
Steel beams	630
Bar iron, nails and muck bar	74,926

The following Board of Directors was elected: Nathaniel Thayer, of Boston;

Orrin W. Potter, Edward C. Potter, of Chicago. The officers elected for the ensuing year are as follows: Orrin W. Potter, president and treasurer; Edward C. Potter, vice-president; Richard C. Hannah, secretary; William H. Hannah, assistant secretary; John C. Parkes, general manager; Francis Hinton, manager at Milwaukee. The manufacture of steel beams, tees, angles, channels and plates and the erection of works for this purpose will be fully considered at an early day.

Machinery.

The Providence Steam Engine Company, of Providence, R. I., who are the sole builders of the improved Greene engine, are now engaged in the construction of engines from 50 to 700 horse-power for the United States Electric Lighting Company, two orders, American Baptist Publication Society, George V. Cresson, C. S. Garrett & Son, Wm. Gray & Son, Croft & Allen, Philadelphia; Victory Mfg. Company, Saratoga, N. Y.; Ramsey & Gore, Ashley & Baily, John Dunlop, two orders, George Frost & Son, two orders, Paterson, N. J.; Peel Brothers, Staffordville, Conn.; Horace Remington & Son, J. P. Campbell & Co., Providence; Congree Mfg. Company, Columbus, S. C.; Hammond, Hull & Co., Savannah, Ga.; P. P. Kellogg, Springfield, Mass.; Jamestown Worsted Mill, Jamestown, N. Y.; Henry Woods, Son & Co., Boston, Mass.

The syndicate that recently purchased the Howe Scale Company's plant, at Rutland, Vt., is composed of Edward Chaffee, John W. Cramton, Dr. John A. Mead and E. D. Keyes.

The Westinghouse Air Brake Company, of Pittsburgh, has practically absorbed the American Brake Company, of St. Louis. The American manufactures a steam driving-wheel brake for engines with reverse action to that of the Westinghouse, and railroads have already adopted it. The American Company also hold a patented improvement of the air brake to facilitate the exhaust of air and to hasten the departure of trains. Under the new arrangement the American Company will confine itself to the manufacture of steam brakes, the Westinghouse taking the improved air brake. The American is capitalized at \$2,000,000, on which the Westinghouse Company guarantees 5 per cent. On the \$60,000 bonds issued by the American Company to secure working capital the Westinghouse Company guarantees 6 per cent.

The Leechburg Foundry and Machine Company, Limited, of Pittsburgh, whose works are located at Leechburg, Pa., are now about completing the placing of their new machinery. After being burned out, this company increased its capital stock from \$50,000 to \$75,000, and are placing the finest machinery that can be gotten.

F. N. Armour has been appointed manager of the C. & C. Electric Motor Company's Western office, which is located in room 6 of the Adams Express Building, Chicago. The main office of the company is at 88, 90 and 92 South Fifth avenue, New York. They manufacture electric motors from one-eighth horse-power up for general manufacturing and mechanical purposes, also the C. & C. portable battery motor. The establishment of the Chicago office has been the means of introducing these motors more extensively in the West, where they have been found to meet a hitherto unsupplied demand for a cheap engine.

The U. S. Rocking Grate Bar Company have removed their office from 154 Lake street to 187 Dearborn street, Chicago. Samuel S. Chisholm is now secretary and manager. He has recently issued new price lists and descriptive circulars. The list of establishments into which this grate

has been introduced is very large and constantly growing. The construction of the grate is such as to secure a differential movement when the lever is worked back and forth, some bars moving through the arc of a larger circle than the others. It is claimed that this movement drops the ashes, clinkers and cinders from the under surface of the fire without disturbing the burning mass and dropping any unconsumed coal. Cast-iron saddles are set on the bars, and they alone come in contact with the fire. When burned, they are easily removed and renewed.

Among those burned out by the destruction of the Pyreon Art Tile Works, at Sing Sing, on Sunday last, were Abram Kipp's brick-making machine shop; loss, \$85,000, and Hiram Rickey, manufacturer of patent baking pans.

Edison's foundry, at Schenectady, was destroyed by fire on Saturday; loss, \$32,000. All the patterns were consumed.

The Grant Locomotive Works, at Paterson, N. J., are in full operation. A great deal of work is being done for the Erie Railroad, and this, with recent orders, will keep the present force of workmen busily employed for six months to come. The company contemplate the removal of their works to some point in the West not yet determined upon. Recently, in view of this purpose, the force of workmen was reduced, but heavy orders compelled the re-employment of as many of the old hands as could be secured. This temporary slackening of work was in some quarters misunderstood to mean that the works were to be closed. As a matter of fact, the company were never more prosperous than now, and nothing is more remote from their plans than a retirement from business. On the contrary, in their new field the company's operations will be extended with a plant that is intended to be the most complete in the country.

The Lewis Foundry and Machine Company, Limited, of Pittsburgh, last week shipped to Trinidad, Col., a considerable part of the new rolling mill to be erected there. The whole will be completed within four or five weeks. This firm had the contract for the entire plant, excepting foundations and building. They now have in hand another new mill, for Alabama.

Manning, Maxwell & Moore, 111 Liberty street, New York, have recently furnished to the Chicago, St. Paul, Minneapolis and Omaha the following tools made by the Pond Machine Tool Company, of Plainfield, N. J.: One 36 x 36 inch planer, with bed 10 feet long; one 18-inch and one 28-inch lathe; also one 13-inch Niles Tool Works slotter. The planer was placed in the St. Paul shops of the company, the 18-inch lathe in the Altoona, Wis., shops, and the slotter and 28-inch lathe were sent to the Sioux City shops.

The Union Stone Company, of Boston, Mass., write us as follows: "We have secured the business of J. W. Dennis, of Buffalo, and the inventions of Mr. F. A. Shoemaker, in center grinders, Universal Travers grinders, cutter grinders, and patent belt shifter, and have several new machines that will soon be ready for the market. Trade we find quite good for time of year—in fact, we are six weeks behind orders on emery-wheels and machines. Mr. F. A. Shoemaker is in our employ as salesman."

The Bed Rock Emery-Wheel Works, formerly of Bainbridge, N. Y., are now located at Gloucester, Mass., and are known as the Bed Rock Emery-Wheel Company.

Curtis & Curtis, of Bridgeport, Conn., manufacturers of the Forbes patent die stock, pipe cutting and threading machin-

ery for hand or power, have just moved into their extensive new works. Notwithstanding that they have now over three times their old capacity, they are already running overtime with all the men that they can run.

Within a year Messrs. William Tod & Co., of Youngstown, Ohio, have sold Porter-Hamilton engines aggregating about 3000 horse-power for wood-pulp grinding. Recent orders are for 500 horse-power from the Kokomo Wood Pulp Company, and 750 horse-power from the Westmoreland Paper Company. They are also building a 700 horse-power compound engine, with surface condenser, for the California Electric Light Company, of San Francisco.

Hardware.

West Lebanon Rolling Mill Company, Lebanon, Pa., are busy in all their departments and running full force. In the chain works they have several contracts with the United States Government for heavy cables for use in the navy. These aggregate over 100 tons.

The Lambert & Bishop Wire Fence Company, of Joliet, Ill., shut down their works on the 21st ult. for repairs and alterations. They will probably remain closed for three weeks. When they start up again a reduced scale of wages will be adopted. The low prices of wire have rendered the cut in wages necessary, in order to decrease the cost of production. The force of workmen were notified of the intended reduction in wages when the works were shut down, so that they might seek employment elsewhere if they concluded not to accept the terms proposed. A report has been circulated that the reduction was 33½ per cent., but this is incorrect, as in no case is such a heavy decrease contemplated. Care has been taken in the arrangement of the new schedule to enable every workman to earn good living wages.

The Wichita Wire Nail Company are building a brick factory, 40 x 300 feet, with a front projection 16 x 40 feet. The engine-room will be 30 x 40 feet, and one story high, the balance being two stories high with basement 137 feet long under one wing. The capacity of the works will be between 20 and 40 tons of nails per day, in the keg. The company will draw their own wire.

The Tuthill Spring Company, of Hammond, Ind., have long made springs for baby carriages. They have now made arrangements to add the manufacture of wheels and axles also, having bought the entire outfit of the Metallic Wheel Company, of Terre Haute, and the patent controlled by that company.

The strike in the barbed department of the Freeman Wire Mill, East St. Louis, inaugurated six weeks ago on account of a reduction of wages, has been declared off, a compromise having been effected.

Miscellaneous.

The Pullman car shops, at Detroit, at the present time are employing over 700 men. The works are running almost to their full capacity, and have not been so rushed with new work for several years.

Rowell & Co.'s plow works, at Hartford, Wis., were burned on Saturday; loss, \$25,000.

The Fuel Gas and Electric Engineering Company, of Pittsburgh, have a contract to put in a fuel gas plant at Salem, Ohio. The city council has granted franchises to a local company capitalized at \$150,000 to operate the plant and furnish gas for heating, illuminating and power purposes. The plans are now being prepared and work will begin as soon as possible.

The Iron Age

New York, Thursday, August 2, 1888.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, JR., - EDITOR.
GEO. W. COPE, - - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - - - HARDWARE EDITOR.
JOHN S. KING, - - - BUSINESS MANAGER.

What is a Reasonable Rate?

The shipping public will take much interest in the case of the Granger railroads against the Iowa Railroad Commissioners, now proceeding. It will be remembered that the Iowa Commissioners promulgated a State tariff which the railroads would be forced to accept and put in use. The company officials found the rates named to be below any previous tariff and below what they considered cost of transportation and a fair profit. At first no way seemed open but to accept the situation. The very name commonly used to describe the railroads affected—Grangers—recalls the fact that in the struggle against the power of State governments to regulate railroads and their tariffs the farmers' granges won a complete victory and settled the question whether our transportation lines were or were not subject to State control. So the attorneys turned to the equity of the case and proposed to show that the rates as arbitrarily established by the Iowa Commission were not reasonable. To prove this they subjected the commissioners to a severe examination, with the result of showing that the proceedings of that body were irregular, and that the reasoning by which many of the changes were made was unsound. One of the commission, under pressure of close questioning, said a rate might be reasonable even though it did not pay operating expenses.

It has been a grievance of long standing with some of our prominent merchants, that while in rate-making there were two parties in interest, the carrier and the shipper, but one of these had the authority, the other generally not being consulted. It must be confessed that the grievance had a foundation in fact. The Iowa Commission, however, reverse this position, the railroads in this case being ignored. The latter case is further complicated by the fact that apparently the judges do not understand the principles of the matter upon which they attempt to pass judgment. It is evident that the solution of our transportation problem is not to come by our adhering to either of these extreme theories. When we examine closely into the matter and follow out our reasoning, we find that we are compelled in the end to choose between two principles: We must rely upon competition, or must have organized and competent regulation by Government. The former plan, which is the basis of the national Interstate law, discourages pooling and even association among railways, upon the assumption that the public will find its best protection by the same strife which we are accustomed to in mercantile affairs. The danger of this plan lies in the essential differences between running a store and operating a railroad, and in such an exaggerated competition as will defeat its own ends and de-

moralize commerce. On the other hand, the theory of exact regulation by Government involves grave questions. Would it be consistent with our form of government? Would it be possible to keep such a department out of the hands of politicians? Certainly the times are not yet ripe for such an experiment. Meanwhile, it must be said that such proceedings as those of the Iowa Commissioners only complicate matters. Undoubtedly there are charges against the Iowa railroads which are true, and items in the classifications and tariffs which should be altered, but the Iowa men, judging from reports of the case, do not seem competent to overturn everything and do it justly. Certainly we should not have Governmental regulation of railroads by any agency which has not knowledge and experience coupled with common sense.

Judge Brewer's decision complicates matters. He holds, in continuing the temporary injunction against the Iowa Commissioners from enforcing the schedule of rates recently adopted, that while legislatures have the right to delegate authority to make rates the latter must be "reasonable." The meaning of this term is declared to refer to rates which will enable a road to earn not only operating expenses, but also fixed charges, and something, however small, in the way of dividends. Only a day or two ago this position was reaffirmed in the Minnesota case.

It is on this very point that the difficulty hinges. We feel convinced that shippers and the public at large will not for any length of time withhold from investors a fair return on the capital actually expended in construction over and above the sums needed for maintenance and improvement. The trouble is that few are willing to take the word of railroad managers for the accuracy of the statements covering cost of building, equipment and terminals, and the possible losses incurred at different times. We are inclined to believe fair-minded men will go even further, and will admit that those who have put their money into railroad enterprises are entitled to compensation in the way of extra profits for the risks taken in embarking upon uncertain ventures. But the public knows that it is paying profits on an enormously inflated capital—that in the majority of cases the returns are made to appear very much smaller than they really are on the actual money invested. We doubt whether the agitation will cease until the conviction is reached that the water has been squeezed out of stocks and bonds, or at least has become ineffective as a pretext for excessive compensation.

In the meantime it is clear that there is as much danger to a good cause from unrestricted power of State and national commissioners governed by political motives only as there is in the abuse of power by railroad managers.

The policy of offering bounties to manufacturers to induce them to locate their shops in certain towns has worked well in numerous instances. Towns now noted for their enterprise and the extent and variety of their trade have first been brought into prominence by their liberality in this respect. There are many ways of paying such bounties, however, and to some of them serious objections have been found. One of the easiest

ways to raise a bounty is by levying a tax on all the citizens by vote of the town authorities. As all classes of property are presumed to be benefited by whatever conduces to the increased prosperity of the town, it would seem to be both reasonable and proper to make all contribute their share to such a commendable object. Small taxpayers do not usually object to this method of raising funds to "boom" the town, but the large taxpayers often protest against it, as they are obliged to bear the greatest part of the burden, which is apt, in their eyes, to obscure from view the larger benefits they will derive. Last week a case of this kind was brought up before a Michigan court for legal decision, some heavy taxpayers of Trenton, Wayne County, denying that the Village Board had authority to vote a bounty to a stove foundry now being erected there under this inducement. In itself this particular case is not of great importance, but if the courts decide against the legality of the tax it will affect many other towns in the State in which the same thing has been done to a greater extent. The taxpayers in those towns also protested at the time, but did not institute legal proceedings to ascertain their rights. They will probably not hesitate if the way is now open to them to demand restitution. Obviously, the safest way to raise a bounty is by voluntary subscriptions, rather than by taxation. The legality of such a method would never be questioned.

Discontented Iron Molders.

It seldom happens that labor organizations give employers much time to consider demands which are to be enforced by strikes if not conceded. The Iron Molders' Union of North America, recently in session at St. Louis, has made a notable departure in this direction. The members of that body have concluded to demand a reduction of their daily hours of employment to nine, and name April 1, 1889, as the date on which the proposed change shall go into effect. This gives the employers eight months' notice, which is certainly ample time for consideration and preparation, and will afford sufficient opportunities for the reconsideration and abandonment of the demand in case the molders themselves should become convinced by intervening circumstances that it would be inexpedient to press it. Their conservatism in this respect is worthy of imitation by other bodies of workingmen. There are many reforms sought by those whose labor is their only commodity that might be accomplished through quiet discussion and prolonged agitation, which are wrecked by attempts to suddenly force them upon employers. It is true that strikes seldom occur until a conference has been sought and the demand has been made and refused. Instances are rare in which no discussion of a grievance or a proposed reform has been had before workingmen lay down their tools. But the time devoted to such a discussion is too often very limited.

The reduction in hours of employment proposed by the Iron Molders' Union is a radical change which needs to be very thoroughly discussed by those directly interested before they attempt to compel employers to adopt it. The statement is

made that the members of the union themselves who were present at the St. Louis meeting were by no means united in support of the proposition. A strong opposition to it was developed, and it was carried by a bare majority. The conservative element evidently knew that many employers would resist to the bitterest extremity an attempt to establish a nine-hour day for molders, and that the enforcement of the demand merely meant a long period of idleness with probably no compensating benefit. They recognized the fact that in many works the molders constitute but a part of the employees, and that the molders' day could not be cut down to nine hours while the mechanics in other departments worked ten hours. Agricultural implement works, machine shops, engine works and similar establishments might be forced to adopt a uniform nine-hour day for all their departments if the molders were granted the proposed reduction. This would necessarily curtail production and increase cost, while the tendency in every branch of industry in late years has been to decrease cost as much as possible.

The partial success which workmen in the building trades have scored in various parts of the country, in establishing a shorter working day, has probably influenced the molders, who were instrumental in committing the union to the support of the demand for a nine-hour day. They reasoned that if carpenters and bricklayers, plasterers and hodcarriers, masons and roofers worked only eight hours a day, and their employers were gracefully accepting the situation, there was no reason why molders should work ten. In their opinion the reduction of but one hour asked for is a very reasonable demand, when the building trades have secured a reduction of two hours. If they had studied the matter further, however, they would have found that the eight-hour day is by no means general among the building trades of the country, that where it is most strictly enforced building operations are severely contracted as compared with previous seasons, and that the impression prevails among the best-informed mechanics that the eight-hour movement was a mistake, to be atoned for as long as the short day exists, and to be corrected before another building season opens if constant employment is desired. This is particularly apparent in the eight-hour cities of the West.

The iron founders of the country have further been advised by the union as to the plan of campaign. The statement is published that if the demand for a nine-hour day is not conceded strikes will be ordered in the smaller shops, and as rapidly as they yield the contest will be extended to the larger ones. It would be singular, indeed, with the plan thus outlined, if the larger founders would not make preparations to stand by their fellow-founders and precipitate a general engagement in which the full strength of the molders' organization would be tested. Of course there are many foundries in which this issue will not come up under any circumstances, the molders being paid by the piece and not by the day. As soon as their usual daily task is ended they quit work, whether they have been engaged for eight, nine or ten hours. The stove foundries and others making specialties come in this class. Their mold-

ers, however, would form a very strong element of support to the union in case the threatened strike should develop.

Judging from the fact that the wages question is not to be made an issue, it would seem that the molders are not disposed to find fault with the rate at which they are paid for their work. If this inference is correct, it is unfortunate that they should permit themselves to be made to appear discontented by the demand made in their name for shorter hours. They are now working but the customary day for those engaged in mechanical pursuits, and they are suffering no hardships beyond the lot of their fellow workmen. Eight months of good, solid, serious reflection will probably bring them to this conclusion and dissipate all danger of an issue coming forward from their branch of the industrial army to derange business in the spring of 1889.

The Trade of British India.

We extract from the annual report of Mr. J. E. O'Connor, Secretary of the Indian Office, for the fiscal year 1886-87, recently published, and the "Statistical Tables for British India," Calcutta, 1887, some data bearing on the progress which that country has made of late years, from an agricultural and commercial point of view. The last census was taken on February 17, 1881, when the population was 253,891,821 to an area of 1,382,624 square miles. The railroads in operation have increased from 5077 miles in 1871 to 12,376 in 1886. Their earnings in 1885 were £18,034,465; the expenses, £8,945,283, leaving the net earnings £9,089,182.

The cotton crops have fluctuated in yield a great deal, as the following figures, covering five years, will show:

	Acres under cultivation.	Outturn of cleaned cotton. Cwt.
1880.....	10,708,002	5,237,845
1881.....	11,204,630	5,081,719
1882.....	12,924,196	6,565,456
1883.....	13,851,179	7,227,992
1884.....	13,352,596	4,472,550

The cotton industry has meanwhile developed in a remarkable manner. In 1878 there were in operation 53 factories, with 1,289,706 spindles and 10,533 looms, the value of twist and piece goods exported being 10,543,630 rupees. In 1887 the number of factories had reached 94, with 2,261,561 spindles and 17,455 looms, the amount of export being 42,189,130 rupees. The shipments went to China, Japan, the Straits, Eastern Africa via Aden, and Persia.

The number of coffee plantations has varied between 1887 and 1885 between 38,682 and 47,978 as extremes, there being 44,985 in the latter year, while their product fluctuated between 24,462,453 and 42,932,437 pounds, the yield of 1885 being 34,959,295 pounds. Greater impulse has been given to tea cultivation than to any other agricultural pursuit. The number of plantations was 2330 in 1878, when the area under cultivation was 199,132 acres, and the product 39,183,667 pounds; in 1885 there were 3578 plantations, having under culture 283,926 acres, which turned out no less than 71,520,800 pounds. The great object in view was to supersede Chinese tea among English consumers through good quality combined with cheapness. This process has been going on so steadily

and successfully that after a couple of years no Chinese tea may be used in England.

Indian wheat has qualities which recommend it for certain uses in Europe; it is, for example, as dry as a bone, and hard, hence it is well adapted for mixing with certain species of European wheat, and for Italian macaroni the flour from it has no rival. Last year's crop has not been up to the average, and the yield of the present crop is threatened by want of rain. Shipments to Europe during the first half of the present year compare with the corresponding period in 1887 as follows in hectoliters:

	1888.		
	To England.	To the Continent.	Totals.
From Bombay.....	1,479,000	2,673,800	4,152,800
" Kurrachee.....	237,800	92,800	330,600
" Calcutta.....	872,900	136,300	1,009,200
Totals.....	2,589,700	2,902,900	5,492,600
In 1887.....	3,520,600	3,520,600	7,041,200

The indigo crop is suffering from drought in Bengal and Behar; the arrivals of Bengal, Kurpah, and Madras indigo in London during the first six months have been 16,928 chests, against 15,707 in 1887 and 18,284 in 1886. Even brewing has taken a start in India. The number of gallons made in 1879 was only 1,569,026; the amount has more than doubled since, being 3,150,342 in 1885.

The importation of the precious metals into India has diminished; in 1860 to 1873 gold importations reached the aggregate amount of 726,062,000 rupees, whereas the total from 1874 to 1887 did not exceed 348,306,000 rupees; the amount of silver received was respectively during the periods named 1,172,242,000 rupees and 915,811,000. Mr. O'Connor expresses the opinion that the ancient habit in India of hoarding gold and silver is gradually on the wane. The result is that amounts long withheld from circulation in that manner emerge from their hiding places and swell the coin in actual use. In other words, India has ceased to figure among nations as a continual absorber of the precious metals, which is an important fact in connection with the silver question.

The foreign trade movement in India, in thousands of rupees, is shown in the statistics given below:

Merchandise.		
	Import.	Export.
1882-83.....	634,562	843,817
1883-84.....	655,819	891,029
1884-85.....	670,282	850,879
1885-86.....	672,893	849,157
1886-87.....	697,148	901,132

Specie and Bullion.		
	Import.	Export.
1882-83.....	134,532	9,809
1883-84.....	128,780	9,816
1884-85.....	138,788	18,873
1885-86.....	154,778	10,878
1886-87.....	110,533	16,845

Specie and Bullion. Excess of Import over Export.		
	Gold.	Silver.
1882-83.....	49,308	74,802
1883-84.....	54,625	64,052
1884-85.....	46,719	72,456
1885-86.....	27,629	116,066
1886-87.....	31,771	71,557

The foregoing tables demonstrate that India is a country in which the export steadily exceeds the import despite the large amounts of railroad and telegraph material that have to be ordered from abroad year after year. It is due to the fact that the bulk of the people, while

being laborious in the field and producing a vast amount of raw material, have not got money enough to buy more than what is strictly necessary.

The Foreign Trade Movement in 1886-87, Reduced to Thousands of Rupees.

Import.		Export.	
Sugar.....	20,805	Rice.....	87,648
Beer.....	3,540	Wheat.....	86,259
Liquors.....	7,706	Tea.....	47,280
Wine.....	3,331	Coffee.....	15,023
Provisions.....	11,795	Spices.....	6,122
Salt.....	7,690	Sugar.....	5,048
Spices.....	6,638	Tobacco.....	1,196
Tea.....	3,243	Cotton.....	134,684
Coffee.....	586	Wool.....	8,996
Tobacco.....	1,105	Silk.....	4,843
Silk.....	7,984	Jute.....	48,698
Cotton.....	1,180	Hides.....	51,492
Coal.....	13,166	Saltpeter.....	3,761
Petroleum.....	12,600	Seeds.....	91,986
Cotton twist.....	33,184	Opium.....	110,777
Cotton goods.....	253,558	Indigo.....	36,917
Woolens.....	15,289	Oils.....	4,588
Silk goods.....	13,711	Twist.....	33,369
Metals.....	46,891	Cotton goods.....	8,783
R.R. material.....	14,351	Jute goods.....	11,519
Machinery.....	13,715	Silk goods.....	3,147
		Woolens.....	859
Total.....	491,018	Total.....	802,995

The above trade was distributed as at foot:

	Import.	Export.	Total trade.
England.....	467,695	342,982	810,677
China.....	21,880	134,339	156,219
France.....	8,035	77,230	85,265
Italy.....	4,255	52,792	57,047
Straits Settlements.....	15,905	41,546	57,451
United States.....	11,703	32,481	44,184
Belgium.....	2,953	36,086	39,039
Austria.....	7,239	26,394	33,633
Ceylon.....	5,378	18,902	24,280
Mauritius.....	16,565	8,815	25,380
Persia.....	5,627	13,599	19,226
Arabia.....	3,172	10,830	14,002
Australasia.....	3,921	5,283	9,204
Zanzibar.....	3,921	4,675	8,596
Aden.....	803	7,159	7,962
Germany.....	1,603	7,846	9,449
Turkey.....	1,799	4,705	6,504
Totals.....	583,454	825,664	409,118

American Trade.		
Fiscal years.	Import into the United States.	Domestic export.
1878.....	\$12,081,505	\$886,998
1879.....	12,225,770	1,142,196
1880.....	21,022,854	2,218,190
1881.....	18,012,206	858,069
1882.....	18,057,913	3,054,787
Totals.....	\$81,400,338	\$8,160,240
1883.....	\$19,467,800	\$2,185,611
1884.....	19,550,458	3,711,259
1885.....	17,699,257	4,103,675
1886.....	17,247,825	4,350,141
1887.....	18,836,090	3,902,047
Totals.....	\$92,801,430	\$18,252,733

The foregoing tables show that good headway has been made in both directions.

Electric Motors.

Electric motors for low power purposes are becoming more and more prominent. In connection with our recent brief reference to their position in the list of domestic motors, it is of interest to note that they are now made to be operated either by a small battery of a few cells or by a current from an electric light wire, and are capable of successfully performing work for which steam-power would be objectionable. For some years the manufacture of electric motors was in an experimental stage, as usual in the opening up of all new enterprises, but by this time the difficulties seem to have been overcome, and those desiring to use electric motors have a number of patterns from which to make a selection. Prices also have become more reasonable, with increased competition and the progress toward greater perfection made through the in-

creasing attention given the subject. The motors can be started, stopped or reversed by a small lever, which instantaneously controls the motion. Jewelers' and dentists' lathes and drills and similar delicate machinery need a motor of this character, which not only operates at a high rate of speed, but can be instantly stopped and reversed if desired. Sewing machines are a class of machinery to which these motors are well adapted. The battery is placed in the cellar or in a closet out of the way, from which wires convey the current to the motor placed on the table of the machine. It is always ready for use, and when not actually in use it requires no attention to keep it in order beyond an occasional recharging of the battery. Pumping machinery for domestic supply in suburban towns is another field to which these motors can easily be employed, with great comfort, benefit and convenience, as any resident of suburban districts can testify who has been obliged to pump by hand.

The great advantage an electric motor possesses is its adaptability over a wide range of uses for power. While it can be made sufficiently large to take the place of a steam engine of comparatively high power, with economy it can also be made small enough to operate the most delicate machinery, requiring but a small fraction of a horse-power. The isolation of motors is another advantage. They can be placed just where they are needed, no shafting being required for the small motors, the attachment being made directly to the machine to be operated. This will be appreciated by a large class of manufacturers operating special machinery, which is run irregularly and without regard to other operations in the same factory. With the extension of electric light service, the more general introduction of these small motors would seem to be inevitable, their value being already widely appreciated.

Foreign Commerce and War Ships.—In the volume entitled "War Ships of the World," recently issued by the Committee of Lloyd's Register of Shipping, at London, statistics are given showing the merchant shipping and commerce of the principal countries in relation to their respective war navies. The tables inform us that the value of the British merchant navy is about \$465,000,000; that of France being about \$45,000,000; of Germany, \$47,500,000; of Italy, \$21,000,000; and Russia, \$10,000,000. The total British annual imports and exports amount to \$3,090,000,000, of which \$700,000,000 are paid for food. The annual trade of France is valued at \$1,490,000,000, of which \$250,000,000 are for food. Germany has a total annual commerce valued at \$1,465,000,000, of which only \$125,000,000 are expended in food; while of the total exports and imports of Russia, which amount to \$405,000,000, only \$35,000,000 are paid for her food purchases. Associated with these figures, we find that Great Britain has 63,000 tons of merchant steam tonnage to each cruiser or sloop; while France has 12,000 tons; Germany, 24,000; Italy, 13,000, and Russia, 6300. Of merchant steamers to each war vessel capable of steaming 14 knots, we have 62; France, 7; Germany, 18; Italy, 4, and Russia 10.

The State Mine Inspector of Iowa reports the output of coal in that State in 1887 at 3,864,490 tons, which is about the average production of the past five years.

CORRESPONDENCE.

"The Mission of Mechanical Engineering Schools."

To the Editor: After perusal of the extracts from the presidential address before the Alumni Association of Stevens Institute on June 13, 1888, given in your issue of July 19, as the author of the paper therein referred to I feel it incumbent, somewhat in my own defense, to reply briefly thereto. I quote from the address:

Should every new, important mechanical device, especially if it brings with it new fields of practical employment and labor for the engineer, immediately find its place as a study in the engineering school?

If this be so, the school of mechanical engineering will have to extend its term of study an indefinite extent, and ere long it will come to pass that the young student entering as a beardless youth will graduate from the school as a gray-haired man in the decline of life. For surely if every important machine is to be the subject of special study in the technical school a lifetime will only suffice to cover the ground. And the result?

The result would be that the engineering schools would be of no use in the world, for the world's engineering work would be being done by outsiders, while the gray-haired students, plodding along, would be kept busy studying this very work and not be active agents in its development.

And from the paper:

The steam engine and the printing press have long been held up as the two great civilizations, as the two fields of human effort, to the cultivation of which the extraordinary progress made in human affairs in the nineteenth century is principally due.

Of course among the vast variety of special fields of mechanical study it is not to be expected that in the college course any particular attention can be given to more than a very few of the most prominent subjects, and we very properly find among them the steam engine. * * *

The printing machine of to-day certainly deserves a higher place in our schools as a specialty in applied mechanics than is indicated by the foregoing.

Now, while the writer would not counsel the abandonment of any of the above-quoted specialties of mechanical engineering to give place to the printing machine it would seem, in view of the acknowledged comparative importance of the latter, that it should have a place among them, even at the expense of a portion of the time devoted to some of them, and possibly (bearing in mind that in the time allowed the total quantity of this kind of study must necessarily be limited) to the exclusion of some of the least important.

Now, it will be quite evident, I think, upon examination of the quotations above that the author of the address ignores almost entirely the major premises in the paper, which are:

1. That only a certain fraction of the student's time can be profitably given to the study of special applications and their theoretical acquirement.

2. That the printing machine, as one of these specialties, has been second in importance only to the steam engine—at least until the comparatively recent development of electrical science, and that now it probably is not below the third place.

3. That a considerable number of special studies of less importance than the printing machine, which are enumerated in the paper, do now, and have heretofore, formed a part of the curriculum of the technical schools.

4. That it would be in the interests of the student, and the best form of efficiency for him at graduation, that less time be expended upon the newer and less important special studies in favor of the older, heretofore totally neglected and more important printing machine.

I submit, then, that the address, so far as it is a criticism of the paper, cannot be said to stand on very solid ground.

The writer fully appreciates and cannot but admire the spirit which prompts the alumnus to defend at every point his Alma Mater. It can hardly be said, however, I think, that the address in this instance

recognizes fully that she can best be defended by increasing her strength, and that she would be strengthened by substituting an important for a less valuable study, which, without expending any additional time on this particular kind of investigation, is what the paper advocates.

It is too common a practice, I fear, in discussions of this kind, where opposing arguments are not easily refuted, to set up men of straw, in the absence of the real antagonist, to exhibit the disputant's prowess in knocking them down again. The quotations show, I think, that the author of the address has made himself amenable to this charge in a very marked degree.

JOHN T. HAWKINS.

TAUNTON, MASS., July 23, 1888.

The Tin-Plate Duty.

CHICAGO, July 30, 1888.

To the Editor: The truthfulness of the familiar aphorism, "Every man has his own axe to grind," is daily being verified, an instance of which occurs in connection with the consideration of tariff on tin plate, if the exposition of intent which actuated the deputation of American sheet-iron makers, who have just given evidence before the Senate Committee on Finance, is correct, as is attributed to them in your editorial. It is therein intimated that the agitation displayed by this body of manufacturers at the possible abrogation of tin-plate duty arises from the fear, solely, of destruction to their sheet-making business, and are not actuated by a desire for a suitable tariff with any view of prosecuting tin-plate making in America.

I am glad to see the suggestion you throw out, that these gentlemen should subscribe capital to erect and operate a tin-plate factory, and thus practically demonstrate the necessity of increased tariff for the profitable working of this industry, or the probabilities are that the little duty tin plate already carries will be ultimately wiped out and the matter closed.

With a duty of 50 per cent. more on iron sheet than on tin plate, we know that while it is profitable to manufacture black sheet it is a certain loss to attempt that of its more advanced product in tin plate. By an array of figures we can show the absolute necessity of a specific duty, sufficiently definite and conclusive to any one with even a slight knowledge of the business; but it would seem that we have to incontestably prove to the satisfaction of legislators, by actual performances, what amount of duty should in their estimation be accorded to it, so that the industry may be retained and encouraged, before any prospect of assistance may be expected; this, therefore, is evidently the proper course to pursue, providing, indeed, the Senate now refuse to place tin-plate duty on an even plane with duties imposed on iron and steel sheets, and which in strict business is only natural we should expect from Republican protectionists, having the welfare and development of the country as the apex of their aims and motives. The sheet-makers will start out with a knowledge of incurring a loss on manufacture; it is for them to sustain this tin-plate making loss, if, by so doing, they protect their sheet business from present destruction and ultimately establish the manufacture of tin plate on a paying basis.

If sheet making is worth retention, evidently something more must be done by makers than calling upon Jupiter to pull them out of the mud hole. It is of no use saying that the matter has been already proven from the fact of the works which had started out to make tin plates, years ago, having closed down from inability to compete with imported plates upon the reduction of tariff, as the conditions of manufacture are so entirely dissimilar then and now as to preclude any

contrast—improved machinery, new appliances and inventions wherewith manufacturing costs are so considerably reduced, affording no criterion for formulating comparisons and deducing any results therefrom. Yours faithfully,

WILKINS TRICK.

Washington News.

(From Our Regular Correspondent.)

WASHINGTON, D. C., July 31, 1888.

The divided opinions of the Republican Senators were very suddenly harmonized a few days ago, when it was discovered that it was the President's purpose, should Congress adjourn without action on the tariff in the Senate, to make that a ground for calling the legislative branch forthwith into extra session. It was his intention to give the non-action of the Senate and their disposition to evade the responsibility of the tariff revision and revenue reduction marked prominence in his official summons. When the differing Senators suddenly had their eyes opened to the fact that they were running their heads into a campaign noose they hastily called a caucus, which was held at the residence of Senator Evarts. There were 31 Republican Senators out of the 38 present.

The principal speech of the caucus was made by Senator Allison, who pointed out that not to take any direct action would subject the Republicans to the imputation of being afraid to meet this issue. He also called attention to the determination of the President to reassemble Congress should that body adjourn without action. The wavering Senators were soon brought into line, and, by unanimous consent, the Committee on Finance were authorized to formulate a bill, report it and endeavor to secure its passage. Since this determination the Senate Sub-Committee have continued their work on their bill with renewed vigor.

The features of the bill as it progresses do not materially vary from what has been stated in *The Iron Age*, giving the general outline of the measure as laid down by the committee in their preliminary discussion of the subject. No action has been taken under any of the schedules without a full and free consultation with parties representing such interests and by voluminous correspondence with others. The most important reduction is on steel rails, from \$17 a ton to 7-10 cent a pound. There will be no change in tin plates nor in cotton ties from existing rates. The Republicans of the committee are disposed to place the tin-plate industry on a footing which would afford American capital and enterprise an opportunity to enter that important branch of manufacturing energy, but they claim that this would be a most inopportune time to do anything which would have the appearance of increasing duties. If the people, by the verdict of November on the issue as now presented by parties, should place their unequivocal condemnation upon everything which even squints toward free trade, the party in power would feel justified in embarking in tariff revision on the theory of full protection to every branch of American industry. As Senator Allison expressed it, the present work of the committee is to provide a measure of revenue reduction with as little interference as possible with existing legislation, which would disturb the industrial interests of the country. The plan of the committee is, therefore, to take as much off the internal revenue taxes as possible, and the rest off sugar and alcohol used in the arts. On the removal or reduction of the sugar duty there are some Republicans who are disposed to raise objection; the sorghum interests of Illinois and several other Western States are not favorable to this proposition. They

may be able to bring about some arrangement by means of which this may be modified. There is also an objection to any change in the duty on salt. These important interests in New York are opposed to the House bill, which places salt on the free list, and they warn the Republicans of the Senate against committing a similar error.

The members of the Sub-Committee on Finance are making no special haste to report their bill, as there are several appropriation bills to be disposed of. Another fiscal year expires to-day. It is expected that the Sub-Committee will report their bill to the general committee during the present week. It may not be reported before next week, when a day will be fixed to take it up for discussion until disposed of.

The House is renewing its antagonism to the fortification bill, and there would be some doubt about making any appropriations except for preservation of existing works and armament if it were not for the influence brought to bear upon the Representatives of certain sections, notably those of the great sea coast cities. The Watervliet gun foundry scheme is having a somewhat varied experience. It started in the Committees on Coast Defenses of the Senate and House and next was brought up in the Military Committee and also had been proposed for action in the Sundry Civil bill. General Tracy has followed this question up with great industry and zeal. As the foundry would be located in his district he does not propose to get left if he can help it.

A Large Lake Steamer.—A 2700-ton steamship was launched on the 28th ult., at Reebolt & Walter's yard, Sheboygan, Wis. The new boat will form part of the Milwaukee fleet. In its construction 950,000 feet of timber were used, all of which but 50,000 feet came from Arkansas and Kentucky. Forty-five tons of steel plates, 35 tons of spikes, and 120 tons of round iron were also used. The total cost of the steamship will be \$140,000. The dimensions are as follows: Keel, 276 feet; length over all, 299 feet; beam, 40 feet; molded depth, 26 feet. Both decks are of 3-inch Georgia plank. There are steel cords running in a straight line from forward to aft inside and outside just below the plank-sheer. A steel cord 60 feet long also runs from upper plate down to forefoot. Another steel cord, $\frac{1}{2}$ x 4 inches, runs diagonally from center to sides, and is embedded in the deck beams. Still another steel cord, $\frac{1}{2}$ x 10 inches, runs under the rail on the outside around the entire boat from stem to stern, between every latch of which there are 84 $\frac{1}{2}$ x 4-inch steel bars running diagonally from center to sides and embedded in the deck beams. The boat is given four spars, with topmasts, and will carry a jib, being the only steamship on the lakes having one. The officers' quarters are commodious and handsomely finished in cherry and antique oak. The engine is triple expansion. The high pressure cylinder is 20-inch bore, the intermediate, 32-inch bore, and the low pressure, 54-inch bore and 42-inch stroke. The boilers are of Scotch type, 11 feet shell and 12 feet long. She has a 13-foot wheel, with a 15-foot lead. The boat is fully equipped with steam-steering gear and other labor-saving appliances.

H. H. Hartman, president of the Hartman Manufacturing Company, of Beaver Falls, Pa., sailed for Europe, on Saturday the 21st ult., on the Cunard steamer Umbria, to be gone about two months. During his absence abroad Mr. Hartman will combine business with pleasure.

A. H. Shipman, inventor of the Shipman engine, died on Monday last, in Geneva, N. Y., of consumption.

"The Crisis in Copper."

Wm. S. Lawson, city editor of the London *Financial News*, has been giving special attention to the position of copper in the world's markets for the past few years, visiting this country twice since 1885. He has just issued a pamphlet, entitled "The Crisis in Copper," which is in the main a reproduction of a series of articles contributed by him to the English press. Among them is one printed in the Edinburgh *Courant* of February 1, 1884, entitled "The Beginning of the Great Fall, 1883," and a second, from the *Times* of August 26, 1885, headed "A Deluge of Copper, 1885," which at the time created a tremendous sensation, and was sharply criticised on this side of the Atlantic.

It is, however, when he deals with the present condition of affairs, and reviews the history of the past six months, that Mr. Lawson's writings are of more immediate interest. The following abstract from an article entitled "The Copper Ring of 1888" is of interest, since it throws some light on the famous syndicate:

What is popularly spoken of as the "Paris Syndicate" is in reality a group of syndicates all working together, but on distinct lines, and without any direct responsibility for each other. The first of them was started so long ago as the early part of last autumn, its members being M. Secrétan and a few of his friends. They were all experts in copper speculation, and, if they are not belied, some of them had a hand in the memorable bear campaign of 1885, which broke the price of copper to under £40 per ton, and produced the doleful situation which M. Secrétan bemoaned the other day in the *Times* and the *Pall Mall Gazette*. Those who watch the copper market closely will have observed that it has a boom almost every autumn. In 1885 and 1886 it was a very mild boom and not long-lived. When M. Secrétan and his friends started in last September, they probably did not contemplate more than the usual autumn flurry. An advance of £5 per ton on copper, and of £2 or £3 per share in Rio Tintos, was, perhaps, the limit of their speculative ambition. Their operations did not, at first, open out very hopefully. They found that they could buy as much copper as they pleased without moving the price appreciably, and they actually secured, in the course of a few weeks, between 30,000 and 40,000 tons, at an average of less than £40 per ton. It was warehoused in London, and financed for them by a bank within a stone's throw of the Stock Exchange.

Meanwhile the rig in tin had reached gigantic proportions and entered on a very exciting stage, the price having been run up in a few months from £105 to over £160 per ton. Accounts vary as to whether or not the Secrétan clique had been engaged in this early maneuver, but the best informed belief is that they were interested in it. At all events, the startling success of the rig in tin first suggested a similar campaign in copper. But the original clique had already their hands full. A new combination was necessary for any large operation, and that, we believe, was not formed till December. Then what may be called the Comptoir d'Escompte syndicate came in. This association did not, as is generally assumed, enter into the gamble, directly or officially. It only supplied from its Board and its *entourage*, financiers of the right sort. No doubt, also, it has found for them the money to gamble with, but they are the gamblers, and not the bank itself. Other financial institutions became parties to the scheme under the same convenient mask. They put no money into it, but they made advances to friends of theirs who wished to go in. In Paris all of them are well known, and quite openly talked about. Next to the Comptoir d'Escompte, the principal supporters of this second syndicate are the Ottoman Bank and the Banque de Paris et des Pays Bas. Its special mission was to engineer a big rise in copper shares, beginning, of course, with Rio Tinto. Here there was more favorable ground to work on than in the copper market itself. Rio Tinto shares were then dirt cheap—in October they had been sold in London as low as 7½—and a huge bear account was open in them on the Paris Bourse. That itself was a splendid lever for the engineers of a boom. The syndicate began buying about 8 or 9, but they did not do this part of the business so skillfully as the capture of the 40,000 tons of copper. Instead of buying quietly and deliberately, taking care not to frighten the market, they went in with a rush, and literally made the shares run away from them. In a little more than a fortnight they had doubled the price and were still buying furiously. Their first 50,000 shares are sup-

posed to have cost them £15 each, and their second 50,000 from £18 to £20. For several days after the failure of the big bear operator, M. Kaltenbach, they bought heavily in order to accelerate his crash, and many of these purchases must have cost them from £20 to £22. Subsequently they lightened the ship of a considerable number of shares; but since then they have always resumed buying when necessary to prevent a bad break.

An ordinary autumn boom in copper rarely lasts more than a month or two, after which the market falls back into its old rut. But, on this occasion, M. Secrétan and his friends did not dare let it take its natural course. Having got their tiger by the tail, they must hold on to him. In order to give the two syndicates time to unload on an unsuspecting public, a third syndicate was needed to prevent the market being flooded with increased supplies of copper, stimulated by the artificial prices the syndicates had created. The bold design was conceived of making forward contracts with the principal copper mines for the whole of their production, one, two, or it might be even three years ahead. The syndicate which had undertaken that colossal responsibility is the most mysterious of the group. All that can be learned about it is that M. Secrétan himself negotiates the contracts in the name of the *Société des Métaux*. So fantastic and grandiose a scheme hardly admits of prosaic criticism, but this much may be said, that a wilder transaction is not recorded in the whole history of commerce. The Indian fakir who stands all day swallowing knives and swords has an easy task compared with the Paris syndicates in swallowing the greater part of the next three years' copper production of the globe. They propose to do in real earnest more than Gargantua attempted in burlesque.

Another chapter from the heading "Fallacies of Copper Statistics" is interesting and brings out some points which we believe the American trade does not generally well understand. We quote the following:

Copper statistics are prepared with very great care and ability, but it is impossible to exclude from them a certain amount of guesswork. With experts and people in the trade this does little harm, as it is understood and allowed for; but casual readers will be apt to find their little knowledge of the subject a dangerous thing. For them it is full of pit-falls, example after example of which can be given off-hand.

An English follower of M. Secrétan, on reading the metal report in his morning paper, will be pleased to see that Chili bars are still firm about £81, but he would be grievously mistaken if he assumed that a cartridge maker when he required copper went and bought Chili bars at £81 per ton, or that a smelter in purchasing copper ore paid for it on the basis of Chili bars. Neither of them is such a fool, for he can do much better. The smelter buys what he calls "furnace metal," namely, ore, matte or regulus, £7 or £8 per ton under the Chili bar rate. The latter has, for years past, been a purely speculative standard, and since this copper boom began it has become more so than ever. There is the same difference between it and the current price of manufacturing copper as between the Bank of England rate and that of Lombard street for day-to-day loans. Chili bars form only one-seventh of the total production of the world, and the idea that they determine the price of the other five-sixths is only a popular delusion—harmless enough in a general way, but very misleading in a speculative craze like the present. It would be much nearer the mark to regard them simply as gambling counters. They have little or nothing to do with the trade price of copper, which follows the rates paid by smelters for "furnace materials." All through the recent excitement "furnace materials" have lagged behind Chili bars, and are even yet several pounds per ton below them.

Another pitfall, into which the unwary student of copper statistics may tumble lies in the technical term "deliveries." Even practical men may sometimes be heard speaking about these as if they represented only copper passing into immediate consumption. But ore or matte or regulus going to the smelters is reckoned a "delivery" just as much as fine copper passing into the hands of the manufacturers. The vital difference in the two cases is obvious. Smelters are not, strictly speaking, consumers of copper; they only complete the process of production, and most of them combine with their proper function that of warehousemen. Years ago, when the trade was much smaller, they kept it in a ring fence, being not merely smelters, but merchants and store keepers. They held all the reserve stock; and not only so, but they kept their thumb very firmly on the amount of it. Not a figure or a statistic was ever permitted to leak out

when the old smelters' ring was at the helm. Though now less influential, it is as fond of secrecy as ever. No one in the trade, least of all M. Secrétan himself, has any idea what stocks the smelters have on hand. Thousands—possibly tens of thousands—of tons which have been charged to them as "deliveries," and are supposed to have passed into consumption, may still be in their stores. Whether large or small, their stocks are an unknown quantity in the situation.

"The copper supply" is a very much wider term than they imagine who have undertaken to keep up the price for three years at a minimum of £65 per ton. As we showed before, it comprises old copper, of which there may be thousands of tons quickly available; it includes warehouse stocks, a large portion of which cannot be traced, and is very deceptively treated, as if it had passed into consumption; it is being added to daily by existing mines, which can turn out 270,000 tons per annum, without allowing for any further development. In a few months further additions will be made to it by new mines and old mines reopened. What is to prevent another "deluge of copper" overwhelming the world, as in 1885? If the market could be flooded at £40 per ton, why not at £77 per ton or £70, or even the syndicate minimum of £65? The engineers of the copper corner seem to us to be deliberately challenging such a result. Not only so, but they are working for it with both hands. On the one side they do all they can to reduce consumption, and on the other they are offering bribes for reckless production. Before they know where they are they may have an avalanche of copper on their hands. Already it is coming back from India, one of the world's oldest and largest storehouses of copper. To the Indians copper is almost a precious metal, being hoarded up like gold or silver. Tempt them with high prices and their exports will rival those of the Rio Tinto. It would be an excellent business just now for India to exchange inflated copper for depreciated silver. By-and-by, when the copper boom has run its course, and a silver boom is being got up for a change, India may return our silver and take back her copper, making a handsome profit on each.

As bearing on the same general subject, we may quote the following from the next article, on "The Visible Supply of Copper":

The visible supply of copper is the pulse by which its condition and its prospects are tested. Recently it has indicated great feverishness and irregularity. In normal circumstances the best remedy would be to remove the cause of fever and relieve the apoplectic patient by bleeding him. That, however, is what the syndicate dare not do. At the doctor's instigation the patient has overeaten himself, and it is the doctor's interest that he should continue overeating himself. The disease itself cannot be removed without ruin to the doctor, but the symptoms may be modified. The patient's temperature may be cooled artificially—in other words, the increasing glut of copper may somehow be made to look smaller than it is.

We have had frequent occasion to point out that the so-called "visible supply of copper" is only a comparative term. It embraces only the stocks at certain recognized points. No doubt these are the most important storage points, and, when the market is left to itself, they may cover practically all the floating supply available for international commerce. But if, for any conceivable reason, it were desired to create a diversion, or to tone down inconvenient statistics, nothing could be easier than to do so. At this moment nearly, if not quite, three-fourths of the copper production of the world is under contract to M. Secrétan and his associates. As soon as it comes into existence they are its owners; they can say what is to be done with it, and where it is to be kept. If M. Secrétan were to ask the Rio Tinto or the Tharsis Company to let a few thousand tons accumulate at their works, they would, of course, do so. If he were to make a similar suggestion to one or another of the American companies they would be equally obliging. The Panulillo and other Chilean companies, with which he is on intimate terms, would make no objection to store their copper for him, so long as he paid for it in terms of his contract.

All the metal thus held back is kept out of reach of inconvenient statistics. So long as it is so held it will never enter the visible supply, and to that extent the visible supply will be underestimated. In a dozen other different ways stocks on hand may be rendered unobtrusive. Copper is not a bulky article, nor does it require luxurious accommodation. It needs no shelter from the weather, and may be stacked in the open air if nothing better offers. For aught that is known the *Société des Métaux* may be forming large accumulations of it at its own works at Rouen. Large quantities of Chili bars have been transferred lately from Liverpool to Havre, and the stocks at Havre

have been greatly increased in consequence, though not so much as they might have been expected to do. Formerly 700 or 800 tons was the average stock of Chili bars kept at Havre and Bordeaux, but at these two ports there are now nearly 5000 tons. Simultaneously the stock of other copper has jumped up from under 1000 tons to 4600 tons. Rouen, though it has never been included in the visible supply, is in fact a much more important storage point than Havre itself. In M. Secrétan's works alone there have frequently been 10,000 tons of copper in stock. There may be that amount now, or there may be even twice as much. When M. Secrétan gets advances from the Bank of France or the Comptoir d'Escompte an arrangement may, without much difficulty, be made for taking a lien on the copper at Rouen or any other point most convenient for him. That would be another side channel into which visible supply might be diverted, and the monthly returns rendered so much the less alarming.

Bad as the statistical position is, we have no safeguard or guarantee whatever against its being even worse than it looks. The visible supply is, as we have shown, a very elastic item, which may be artificially contracted or expanded at the will of powerful manipulators. It represents only the stocks at a dozen or more selected points, and there may easily be 30,000 or 40,000 tons more copper at other points, as to which no reliable information can be obtained. It takes no cognizance whatever of second-hand copper, which is known to have accumulated to the extent of thousands of tons in the hands of smelters and manufacturers. It ignores the stocks held in India on speculation, much of it by the syndicate itself. These were bought up in the early stages of the boom, and are now held at an average of £70 per ton. They are part of the cause of the depression among the Birmingham manufacturers, and they may be the means of prolonging it even after the inevitable fall in the value of copper has taken place. When the demand in India arrives, these accumulations of £70 copper will have to be worked off before there can be an outlet for new shipments. In the same way the stocks of old copper which have been collected by English manufacturers will have to be got rid of before any strong demand can arise for new copper.

If such outside stocks in private hands were added to the official statistics the "visible supply of copper" at this moment would be very much more formidable than the 69,000 tons now weighing so heavily on the market. A direct and practical proof of their magnitude is to be found in the fact that buyers of copper rarely have to go to the syndicate for it. There are smelters and merchants outside of the syndicate who can supply all that is wanted for the daily requirements of business at £5 or £6 per ton under the syndicate price. So limited are the current necessities of the manufacturers that hardly a transaction occurs which would not have been considered a mere bagatelle 12 months ago. The consumption of copper is even smaller than the attenuated deliveries indicate, and the actual accumulations of stock are very much larger than appears in the "visible supply."

Among the other articles making up the series are the following: "What the Ring Has Undertaken," "Birmingham and the Copper Ring," "The Copper Corner in America," "Bolstering the Share Market," "The Copper Companies' Dividends in 1887," and "Hard Facts for the Syndicate."

On the whole, Mr. Lawson takes an extremely bearish view of the situation of the metal, although he recognizes the fact that Secrétan and his followers have the power, and may exercise it, of calling for a reduction in the output of the mines controlled by him, and he suggests that as a last resort the syndicate may be able to induce the companies to lower their contract prices in order to enable it to let the market down easily. Though the corner seems doomed, there are various ways in which it may break up. It may do so violently or gradually, suddenly or cautiously. Eighty pounds per ton copper is an anachronism as difficult to bring back to life as Queen Anne would be.

The new constitution of the Amalgamated Association adopted at the convention of that organization, held in Pittsburgh last month, contains a number of changes, the most important being a clause making a number of other workmen eligible to membership. The new classes of

workmen that are now eligible are: Metal and other stockers, bar bankmen, cinder wheelers, carpenter-millwrights, hollow firemen, shearers and other crews, tap welders, butt-welders, turners-down, pit-hands, takers off, bar pullers, skelp benders, roll setters, socket-makers and ball grinders working in wrought-iron pipe mills, blacksmiths, machinists, millwrights, greasers, firemen, water-tenders and all hands employed in nail, tack and spike factories, wrought-iron pipe mills, galvanizing works, bolt, nut, washer and other factories and shops run in connection with iron and steel mills, except furnace builders, bricklayers and common laborers.

The Strike at Singer, Nimick & Co.'s Works.—As we predicted in our issue of last week, the strike at the steel works of Singer, Nimick & Co., Limited, at Pittsburgh, has been settled, the firm having gained a complete victory over the Knights of Labor. Every department of the works is now in full operation, and applications are being received every day from old employees who wish to be taken back into the employ of the firm. As we have already stated, the trouble was not one of wages, but was caused by the firm coming to the conclusion to operate their mills in the future independent of the Knights of Labor or any other labor organization. In this they have been wholly successful, and from this time forward their employees will be all non-union men. The effect of this victory is being strongly felt by the Knights of Labor, and a very large number of members have receded from the ranks of that organization, and it is the general belief that in a short time its power among the manufacturing establishments at Pittsburgh will be wholly departed.

Mr. David H. Thomas, superintendent of the Thomas Iron Company, reports to us that in one week No. 3 Thomas furnace, at Hokendauqua, made 511 tons of iron, using three-eighths Lake Superior, three-eighths New Jersey magnetite and two-eighths native hematite, producing 511 tons of iron, of which 171½ tons were No. 1 X, 115 tons were No. 2 and 224½ were plain 2, the quantity of ore charged being 895 tons, and limestone, 290 tons. The fuel consumption was 576 tons, 144 tons being coke. This includes an allowance of 6 per cent. for waste, so that as usually reported the fuel consumption would be somewhat less. We may add that the company are building one set of Durham pipe stoves for No. 1 furnace.

The example of the town of Waldoboro, down in Maine, says the *Boston Herald*, in erecting and fully equipping a building for the manufacture of shoes, at the expense of \$20,000 for the sole use of a Massachusetts firm which had offered to locate its eastern business there on the fulfillment of these conditions, is rather generous, to say the least. Numerous towns and cities have offered to exempt the property of new business firms from taxation for a time, on condition of their establishing themselves within their limits, but building and fitting out a factory is offering a rather tempting inducement to business concerns. If this sort of thing keeps on, there is nothing which a town may not do in order to bring business to it.

On the 31st ult., the boiler room and bridge house of the Muirkirk Furnace, at Muirkirk, Prince George's County, Md., was burned down, and the furnace chilled. The machinery for crushing ores and other parts of the plant are ruined. Mr. Charles E. Coffin informs us that, while he is insured, the sum will probably not cover half the loss. The destroyed portions of

the plant are to be rebuilt, but as yet it is not known when the furnace will go into blast. Mr. Coffin contemplates putting up an iron stock house and elevator if it can be done cheaply.

Cast-Steel Guns.—A press telegram from Washington, D. C., to Pittsburgh, under date of the 26th ult., gives the following information in regard to the cast-steel gun recently built by the Pittsburgh Steel Casting Company, of Pittsburgh, and which has been sent to Washington for the purpose of being tested. The Pittsburgh cast-steel gun has been moved to the shell-room of the ordnance foundry at the navy yards, and workmen began to-day to remove the unevenness that remains after rifling and cutting the place for the breech. This process of "lapping" out will require some time, but still more time will be required to construct the mechanism of the breech, as all departments are overwhelmed with work. The band for elevating and depressing the gun has also to be put in place. It is thought that the gun will be ready for the test within 30 days. Without special announcement another cast-steel gun, with a bore similar in size to that of the Pittsburgh gun, has recently made its appearance at the Navy Yard. It is from the works of the Standard Company at Thurlow, near Chester, Pa. The Thurlow gun is not yet placed upon the lathe, but lies just as it was received from the foundry.

In his forthcoming report Col. Sydney Maxwell, Superintendent of the Cincinnati Chamber of Commerce, says that last year the receipts of manufactured iron in that city aggregated 155,885 tons, the largest in its history. He says that 108 acres of ground have been secured on the Ohio River, adjacent to Cincinnati, for the erection of the largest and most complete plant in the world for casting iron pipe.

A correspondent writes us: "T. J. Lattner is building a nail factory at Rome, Ga., and was in Pittsburgh last week purchasing machinery, &c., for his works. The nail machines he bought from the American Nail Machine Company, at Ashtabula, Ohio, at the low price of \$110 each. Four years ago these machines sold for \$300 each, with the demand greater than the supply. This condition of affairs can only be accounted for by ruinous competition, overproduction or tariff tinkering."

The National Pipe Bending Company, New Haven, Conn., have been very busy for the last month in the manufacture of their National feed-water heater and coils of iron, brass and copper pipe, for which they have special machinery. They are now making three coils containing 1000 feet each of 1½-inch iron pipe, which are to be shipped to Louisiana; this is the third order for that size coil.

Mayor Hewitt, on Tuesday, appointed four Aqueduct Commissioners—namely, Gen. James C. Duane, until recently chief of the Engineer Corps, United States Army; Francis M. Scott, of the County Democracy, and Assistant Corporation Council since 1885; ex-Assemblyman Walter Howe, Republican, who is a lawyer, and John F. Tucker, a well-known builder.

A bill in Congress proposes to retaliate any discrimination against American vessels passing through the Welland Canal by imposing a toll of 20 cents per ton on all foreign vessels passing through the Sault Ste. Marie Canal.

The blast furnace of the Thomas Furnace Company, of Niles, Ohio, was blown in to-day to manufacture Bessemer pig iron for the trade.

Foreign Markets.

EQUIVALENTS	Cents.
Franc, Peseta or Lira.....	19.3
Florin (Netherlands).....	40.2
Florin (Austria).....	35.0
Milreis (Portugal).....	\$1.08
Milreis (Brazil).....	54.9
Mark (Germany).....	25.8
Kilogram.....	220.5
Picul.....	334.

BRAZIL.

PARA, July 24, 1888.—*India Rubber*.—Light receipts during the month have caused our market to stiffen, values, moreover, being favored by the considerable rise in Exchange. July 27.—Our market has advanced 50 reis $\frac{1}{2}$ kg.; there remain unsold only 10 tons. The arrivals in July will fall off 200 tons from those of July, 1887. Exchange unaltered. *Silver*.—The Government have resolved to withdraw from circulation the 500 and 2000 reis Treasury notes, and replace them by Silver Coin. Some \$7,000,000 worth of Silver will consequently have to be purchased abroad by the Imperial Mint.—*Per cable direct*.

AUSTRALIA.

MELBOURNE, July 13, 1888.—*June Shipments* from Melbourne, Adelaide, Sydney and Queensland to England were composed of 8000 bales Wool, 1100 tons Tallow, 300 tons Copper, 100 tons Copper ore, 8700 cwt. Wheat, 900 tons Flour and 400 tons Tin.—*Per cable via London*.

EAST INDIES.

SINGAPORE, July 13, 1888.—*Tin*.—Our last report was dated 31st ult., since when there is no material change in the position. Buyers offer according to the prices ruling in London, but sellers refuse to part with their old stocks, and the arrivals from the mining districts have been very small. The last transaction was at \$33.50. *Tonnage*.—Steamer rates to London are steady for immediate shipment at 27/6 @ 30/ for weight. For New York via Canal no tonnage offers; via Cape, the Wilhelm Anton, clears to-day, leaving the berth to the Sesi-noora. Rates are unchanged. For Boston the berth is vacant. *Exchange* is quoted 3/1 $\frac{1}{2}$ for six months' sight.—*Gilfillan, Wood & Co.*

MANILA, July 23, 1888.—*Hemp*.—There are buyers at \$9.25 $\frac{1}{2}$ picul, against \$8.12 $\frac{1}{2}$ same time last year, equaling, cost and freight $\frac{1}{2}$ ton, £31. 5/, against £27. 13/4. Clearances for the United States since last cable there were none, against 2000 bales last year; ditto since January 1, 99,000, against 125,000; loading for the United States, none, against 11,000. Cleared for Great Britain since January 1, 193,000, against 115,000; loading for ditto, 23,000, against 21,000. Cleared for all other countries, 45,000 bales, against 23,000; receipts at all ports since last cable, 5000, against 7000; ditto since January 1, 328,000 bales, against 257,000 last year and 210,000 in 1886. *Freight*, \$6, against \$5 in 1887. *Exchange*, six months' sight, London, 3/5 $\frac{1}{2}$, against 3/5 $\frac{1}{2}$.—*Ker & Co., to Charles Nordhaus, New York, per cable direct*.

CALCUTTA, June 16, 1888.—*Jute*.—The tendency in the Jute market here has been a quieter one for the past ten days. Sales were made of September-November delivery at 27.8 rupees $\frac{1}{2}$ bale, f.o.b. Balers do not press the sale of later futures. Advices from Narain-gunge are disquieting with reference to the new crop. There have been everywhere in the region either rains or a clouded sky, an unusual kind of weather during the dry season; as, at the same time, the monsoon suddenly set in, the plant cannot mature properly. Hence it is estimated that the yield in Narain-gunge will fall 25% short of last year's. There has been no abatement in the high temperature here of 103° in the shade. The sky is clouded; rain is looked for in a day or two.—*Times of India*.

SPAIN.

BILBAO, July 14, 1888.—*Iron Ore*.—For three months past there has not been the animation noticeable during the present week and fortnight, numerous single cargoes being taken at 6/10 @ 7/3 $\frac{1}{2}$ ton, Rubios, and at 7/6 @ 8/ Campanil, total shipments to date summing up 2,064,570 tons, as compared with 2,430,300 in 1887. *Pig Iron*.—The export reached 2515 tons, and coastwise shipments 688 tons. The spot price here is 57 @ 60 pesetas, futures 55 @ 58, and Lingotillo, at Huelva and Seville, 65.—*Bilbao Marítimo y Comercial*.

SWITZERLAND.

ZURICH, July 18, 1888.—*Silver Coinage*.—The Federal Council declines to allow Italy, as member of the Latin Union, to recoin its old Bourbon dollars into five-franc pieces and fractional silver coin, as this would only be increasing the silver circulation with which Switzerland, since the late decline in the metal, is being flooded from Italy. Besides, at the last Latin Union conference both the Belgian and Swiss delegates emphatically declared that they

were opposed not only to all new coinage of Silver, but quite as much to recoinage a portion of the five-franc pieces at present in circulation.—*Neue Zürcher Zeitung*.

GERMANY.

HAMBURG, July 21, 1888.—*Iron*.—Pig Iron has continued quiet in Rhenish-Westphalia, the Transatlantic demand for Spiegel does not revive, but the domestic inquiry compensates for this; 10 to 12% is quoted 57 marks. Orders are booked three months ahead. Rolling mills have bought little or no Forge Pig, still being engaged in stock taking as they are, but this interruption will soon cease. Some temporize, because they first want to await the fate of the various syndicates, the continuation of some of which seems precarious. Good quality Forge Pig is worth 50 marks $\frac{1}{2}$ ton in Rhenish-Westphalia, and 47 to 49 in the Siegen district. Thomas is in brisk demand and very firm; Luxembourg is quoted 38.70. Domestic orders for Merchant Iron will last for three months to come. Although there is still a lack of export demand, the price remains 125 to 127.50. Aggregate sales during second quarter have been considerably below those made during the first quarter. While boiler plates have remained as lively as before, thin sheets are neglected; the Wire Rod export demand does not revive; Machine shops, foundries and car works are all doing well. *Spelter*.—Advices from Silesia state that Spelter production in the province is at present decreasing, together with that of desilverized Lead. The output of Spelter during the first quarter was 20,000 tons as compared with 20,478 tons during the corresponding period in 1887, the deliveries being 19,727, against 16,805; the number of workmen employed was 6047, against 6269; the export from all Germany declined during the first four months from 15,934 tons of Spelter and Scrap Zinc to 14,911 this year, and of rolled from 5425 to 3483 tons. The Hamburg market for Spelter has remained firmly sustained. German Lead is rising and now commands 13.60 marks $\frac{1}{2}$ 50 kg., while Copper is weaker.—*Börsenhalle*.

Strikes and Lockouts.

The "Report upon Strikes and Lockouts" compiled under the supervision of Hon. Carroll D. Wright, Commissioner of Labor, has just been issued from the Government Printing Office. It covers the period of six years, ending December 31, 1886, and is very thorough in its details of the subject. In fact, the ponderous volume of 1172 pages would be of little use except to specialists were it not for the excellent analysis of the tables which Mr. Wright has compacted into 25 pages. Great pains have been taken to insure the accuracy of the report, and it may be accepted as a complete and correct history of the matter undertaken, or at least as nearly so as could be possibly obtained.

OBTAINING THE DATA.

The methods under which this investigation has been conducted were as follows: The files of all the leading newspapers, trade journals and commercial periodicals published in the United States during the years involved in the investigation were searched for all references to strikes. The agents of the Bureau of Labor were thus supplied with primary evidence of the existence of strikes, the names of the parties interested and the establishments concerned. They were also instructed to make diligent inquiry in all directions for other strikes, especially from labor organizations and manufacturers' associations. The Commissioner of Labor believes that by these means the Bureau has secured information relating to nearly every strike, if not every strike, which has occurred in the United States during the six years ending December 31, 1886.

Four leading causes of strikes are: for increase of wages, for reduction of hours, against reduction of wages and for increase of wages and reduction of hours. These were the causes of the strikes in 77.16 per cent. of the establishments. Strikes were made in 800 establishments for reduction of hours and against being compelled to board with employer.

It is shown by the summaries that out of the whole number of establishments affected success followed the strikes in

10,375 establishments, or 46.52 per cent. of the whole; partial success was gained in 3004, or 13.47 per cent. of the whole, and failure followed in 8910 establishments, or 39.95 per cent. of the whole number, and strikes were still pending in 15 establishments on December 31, 1886.

For lockouts 564 establishments, or 25.47 per cent. of the whole, succeeded in gaining their point; 190, or 8.58 per cent., partially succeeded, and 1339, or 60.48 per cent., of the whole failed, while lockouts were still pending in 121 establishments, or 5.47 per cent., on December 31, 1886.

THE LOSSES ENTAILLED.

The loss to the strikers for the period involved was \$51,814,723. The loss to employees through lockouts was \$8,157,717, or a total wage loss to employees of \$59,972,440. These losses occurred in 24,518 establishments, being an average loss of \$2446 to each establishment and of over \$40 to each person involved. A table is given showing the number of days required for employees to recover wage losses in wholly successful strikes for increase of wages.

The extreme cases are a laborer's strike in New York, in which the average wages lost were 61 cents and the time to make up the loss was only one day, and a strike of binders and trimmers of fur hats at Danbury, Conn., in which the wages lost were \$19.24, and the increase gained was only 1 cent per day, so that it required 1924 days to make good the loss. The average wages lost per employee in all the successful strikes was \$20.42, the average gain in daily wages was 27 cents, and the average time to make up the loss was 76 days.

Mr. Wright thinks that the turning point was reached in 1886, and that it can be emphatically stated that strikes are now on the decline.

The chapter upon strikes and lockouts prior to 1881 contains much interesting information. The first strike of record was that of the journeymen bakers in New York city in 1741. They were tried for a conspiracy not to bake, until their wages were raised, and convicted, but it does not appear that any sentence was ever passed.

SOME OLD-TIME STRIKES.

In 1796, 1798 and 1799 the journeymen shoemakers of Philadelphia struck for higher wages and were successful. In November, 1803, a strike occurred in New York City which is commonly known as the "Sailors' strike," and which has been generally considered as the first strike in the United States. A number of sailors struck for an increase of pay from \$10 to \$14 per month. They marched around the city and compelled other seamen to leave their work, but were put to flight by the constabulary, who arrested their leader and lodged him in jail. The strike was a failure.

A very singular strike occurred in 1817 in Medford, Mass. Thacher Magoun, a shipbuilder, notified his men that he would not furnish them with the customary grog, and that no liquor should be used in his shipyard. The men wrote the words "No Rum! No Rum!" upon each stick of timber in the yard, and some of them refused to work, but finally gave in.

This was paralleled by a general strike of employees upon the railroad between Reading and Hamburg, Pa., in 1839, where the demand was for an increase of pay from \$1 to \$1.12 $\frac{1}{2}$ per day, and for more whiskey, the allowance being a pint and a half per day to each man, dealt out in nine doses.

The compilation of the statutes of the different States concerning strikes, combinations, conspiracies, intimidations, boycotts, &c., shows that Maryland, New Jersey and New York have enacted laws authorizing combinations of workmen to secure advances in wages.

TRADE REPORT.

Chicago.

Office of *The Iron Age*, 95 and 97 Washington St.,
CHICAGO, July 30, 1888.

Pig Iron.—The increased business which has been threatening for some time made its appearance last week. Buyers took hold very liberally in several lines, notably in Lake Superior Charcoal and Ohio Softeners, with also some regard for Southern Coke. The sales of Lake Superior Charcoal and Alabama Car-Wheel aggregated over 20,000 tons, distributed among Malleable Casting and Car-Wheel manufacturers and the Agricultural Implement trade. Several thousand tons of Southern Coke and Ohio Softeners were also disposed of. Although these sales constitute a regular feature of the trade at this time of the year, and therefore do not indicate in themselves a radical change in the market, yet a good feature of the situation is the fact that the buyers were not able to break prices to any extent. One or two contracts for Lake Superior Charcoal were placed at quite low figures, but most of the orders were based on \$19 and \$19.50, cash. The lowest sellers are now in a position to demand an equal price with the balance of the trade and insist that they will no longer make concessions. Lake Superior Coke was not in as strong demand as some other Irons; nevertheless a considerable number of small orders were booked. The makers of Coke Irons, both Northern and Southern, are now disinclined to take orders extending beyond this year, while most of them are endeavoring to shorten the time to three months. Cash quotations are as follows, f.o.b. Chicago: Lake Superior Charcoal, all numbers, \$19 @ \$19.50; Alabama Car-Wheel, \$26.25; Southern Charcoal Foundry, No. 1, \$18 @ \$19; Jackson County Softeners, No. 1, \$17.50 @ \$18; Hocking Valley, Soft Foundry, No. 1, \$16.50 @ \$17.50; American Scotch (Blackband) No. 1, \$18.25 @ \$19; other Ohio Scotch Irons, No. 1, \$17.50 @ \$18; Lake Superior Coke, No. 1, \$17 @ \$17.50; No. 2, \$16 @ \$16.50; No. 3, \$15 @ \$15.50; Southern Coke, No. 2, \$17; No. 2½ and Open Bright, \$16.50; No. 3, \$16; No. 1 Mill, \$15.50.

Bar Iron.—The heavy inquiries from the Agricultural Implement trade alluded to in last week's report have not yet been placed, but will be very shortly. They will probably be 25 % in excess of the orders placed last year, owing to the prosperous condition of the farmers. Jobbers and small consumers are in the market for a considerable quantity of Iron, but the mills are slow about starting up and agents are somewhat at sea in making quotations for early deliveries. The usual rate for carload lots is 1.65¢, half extras, f.o.b. Chicago, for Common Iron, but some sellers ask more, while a few are willing to shade this quotation for satisfactory specifications and deliveries. The organization of Western Bar Iron manufacturers is expected to play an important part shortly in regulating production and preventing the cutting of prices. Store quotations range from 1.90¢ to 2¢, according to quantity and quality.

Structural Iron.—The demand has been quiet of late, except for small lots from store, which are freely called for. A contract for an Iron swing-bridge across the Calumet River was awarded to P. E. Lane & Co. for \$6392. Mill lots quoted as follows, f.o.b. Chicago: Angles, 2.20¢; Universal Plates, 2.25¢; Tees, 2.45¢; Beams, 3.40¢; Store prices are as follows: Angles, 2.40¢ @ 2.70¢; Tees, 2.60¢ @ 2.90¢; Beams and Channels, 3.80¢.

Plates, Tubes, &c.—A very large business has been transacted in Plates. Although the mills have advanced their rates on Tank and Heavy Sheet Iron and on large lots of Boiler Tubes, the local dealers have as yet made no change in their prices and still quote as follows: Heavy Sheets, Nos. 10 to 14, 2.65¢; Tank Iron, 2.55¢; Tank Steel, 2.80¢; Shell Iron, 3¢; Shell Steel, 3.25¢; Flange Iron and Steel, 4¢; Fire-Box Steel, 4.75¢ @ 5.75¢; Boiler Rivets, 4¢ @ 4.25¢; Ulster Iron, 3.75¢; Boiler Tubes, 60 % and 10 % off on 2½-inch and larger and 62½ % off on 2-inch and smaller.

Sheet Iron.—Brokers are now having much difficulty in finding mills ready to take orders for Black Sheets, as many have their capacity engaged, and others are not running. Those in a position to handle some of the business offered ask 2.95¢ @ 3¢, f.o.b. Chicago for No. 27. Jobbers quote 3.10¢ @ 3.20¢ from store for small lots of No. 27, and are having a good demand from the trade.

Galvanized Iron.—Manufacturers' agents report another heavy week. Cornice-makers, car builders and other classes of consumers have taken large quantities. They find prices more easily sustained. Small lots continue to be quoted at 60 % and 5 % off for Juniata, and 60 % and 10 % off for Charcoal.

Merchant Steel.—The heavy consumers are now soliciting bids for their year's supply, and it is reported that some of these orders have already been placed at prices approaching those prevailing two years since. Store trade has been excellent, the orders though small being numerous. Quotations range as follows: Bessemer Bars, 2.30¢ @ 2.50¢; Tool Steel, 8¼¢ @ 9¼¢; Specials, 13¢ @ 25¢; Crucible Spring, 4.40¢; Open-Hearth Spring, 2.90¢; Open-Hearth Machinery, 2.75¢ @ 3¢; Crucible Sheet Steel, 7¢ @ 11¢.

Steel Rails.—A few contracts are under negotiation, but no sales have been made for some time, and the local manufacturers are fast approaching the last of their orders. They are inclined to take some encouragement from the crop reports and from the recent decision of Judge Brewer in the Iowa railroad cases, both of which will have a favorable effect on railroad earnings and railroad securities, thus leading to purchases of Rails, but the benefits thus expected are remote. In the absence of business quotations are nominal.

Old Rails and Wheels.—Sales of Old Iron Rails are reported at \$19, \$19.50 and even \$20. A sale of 1000 tons at an interior point was made at \$19.50, and another lot brought \$18.50 on the Ohio River, equal to \$19.50 or \$19.75 here. The supply is now quite limited, while there are numerous inquiries from consumers willing to pay \$18.75 @ \$19, but who feel that \$19.50 @ \$20 is too high in proportion to the price of Bar Iron. Old Car-Wheels are a trifle higher and could now be sold at \$19, but they seem to be very scarce.

Scrap.—Wrought Scrap is lower, with very little moving. A moderate demand is experienced for cast. A limited sale has been found for Borings and Turnings, but they are only wanted at low prices. Steel is very quiet. Mixed Country Scrap is quoted at \$11 @ \$11.50. Selling quotations for carefully selected are as follows, per ton of 2000 lb.: No. 1 Forge or Railroad Shop, \$16.50 @ \$17; Track, \$16; No. 1 Mill, \$12 @ \$12.50; Light Wrought, \$8; Horseshoes, \$16.50; Axles, \$22; Cast Machinery, \$12 @ \$12.50; Stove Plate, \$9.50 @ \$10; Cast Borings, \$7.50 @ \$8; Wrought Turnings, \$10; Axle Turnings, \$11.50 @ \$12; Coil Steel, \$13; Leaf Steel, \$14; Locomotive Tires, \$14.

Hardware.—A very good trade is reported from jobbers in Shelf Hardware. The demand is now running largely to fall goods, such as Sheet Iron, Nails, Tin Plate, Tinners' stock of all kinds, Stove Boards, Coal Hods, Stove Furniture, &c. Prices are being steadily maintained, and in nearly every respect the condition of this branch of trade is highly satisfactory. Jobbers in Heavy Hardware are feeling a little improvement in their trade also, particularly in the demand for Wagon Material.

Nails.—Although manufacturers' agents report actual business as very slight in volume, they are in constant receipt of a stream of inquiries, indicating the anxiety with which the course of the market is now being watched. Any indication of prices hardening would doubtless cause a rush of orders. Large lots of Steel Nails from factory are still quoted at \$1.90 @ \$1.92½, f.o.b., Chicago, for ordinary specifications, while small lots from store are held at \$2.05. Jobbers quote Wire Nails at \$2.50 @ \$2.60.

Barb Wire.—Trade is very dull, most of the factories being shut down for repairs, and the jobbers making no effort to force business. Small lots are still quoted at 3¢ for Painted, and 3.75¢ for Galvanized.

Pig Lead.—Manufacturing consumers have purchased quite freely, both spot and futures, taking in the aggregate over 600 tons, which was bought at 3.85¢ @ 3.90¢. The tone of the local market has been very firm and values have been well maintained, 3.90¢ being bid for Desilverized at the close of the week.

Copper.—The negotiations referred to last week are still continuing, buyers hoping to get lower figures and sellers resisting.

Philadelphia.

Office of *The Iron Age*, 230 South Fourth St.,
PHILADELPHIA, Pa., July 31, 1888.

Pig Iron.—The market has maintained a firm tone, and, although there are no changes in quoted rates, holders appear to be gaining confidence, so that, as compared with last week, the position is probably a shade better. In any case the disposition is to ask full prices, while requests for concessions are not entertained for a moment. Still there are no indications of any important changes, as there is plenty of Iron for sale yet, although not precisely such brands as consumers would prefer. But on any slight advance it is believed that the supply would soon be increased, so that consumers are in no hurry to place orders at advanced prices. The position is carefully watched, however, the feeling of confidence being so general that people are inclined to look only on one side of the market, and that for the present is the bright side. But, as already stated, while consumers are willing to buy liberally, and have bought liberally at the old prices, they are not ready to pay an advance, unless for small lots, or under special circumstances. The sellers' standpoint is about as follows: Those who make really good Iron have already sold as much for forward delivery as they care to sell, and are asking a small advance on new orders. Those who occupy a less favorable position in the trade are still quoting the old prices for prompt deliveries, but are not generally willing to accept orders for delivery later than October. This statement fairly covers the entire field, so that further comment seems to be unnecessary. Sales during the week taking the extreme limits at both ends have been as follows for tidewater deliveries: No. 1 Foundry, \$18 @ \$19; No. 2 do., \$16.75 @ \$17.50; Gray Forge, \$15.75 @ \$16.25. Southern Irons might possibly be had for

less money, but there is no demand, and no offerings at prices likely to prove acceptable to buyers.

Foreign Iron.—Prices are entirely nominal, as there is no demand, and no inquiries likely to lead to business at present. Asking prices are as follows: Bessemer, \$19 @ \$20, c.i.f., duty paid, and 20 % Spiegel, \$26 @ \$26.50.

Blooms.—Steel moves fairly in small lots. Prices about as follows: Slabs and Billets from \$29 to \$35, f.o.b. cars at mill, according to analysis; Charcoal Blooms, \$52 @ \$54; Run-out Anthracite \$42 @ \$44; Scrap Blooms, \$34 @ \$35 per "bloom" ton of 2464 lb. Foreign at tide, c.i.f., duty paid, \$29 @ \$30 for Nail Slabs; \$31.50 @ \$32.50 for 4 x 4 Billets, and \$35 @ \$39 for Siemens-Martin, price according to analysis, &c.

Muck Bars.—The demand is improving, and sellers find the market still in their favor. Sales during the week have been made at \$27 @ \$27.50, delivered, with a general disposition to stand out for \$27.50 @ \$28, delivered.

Bar Iron.—There is very little doing in Bars, and such demand as there is met at very irregular prices. Some quote 1.85¢ firm, while others claiming to make strictly refined Iron are willing to shade 1.8¢, and still others go considerably below that figure; all depends on what a buyer is willing to accept as first quality. Skelp Iron is in better demand, however, and sales of about 2000 tons of Grooved are reported at somewhat higher figures than quoted a week ago. Sellers ask 1.82½¢ @ 1.85¢, delivered, but it is reasonably certain that the sales in question were at lower figures than these. But there is no doubt that manufacturers feel more confident of their position, and for the present, at least, will stand out for better prices.

Plate and Tank Iron.—There is nothing materially different from last week. Business in small lots is fairly active, but there are no large orders on the market, and mills do very little more than hold their own. Still the tendency toward improvement in other branches imparts a more hopeful feeling, and manufacturers believe that their turn will come soon. Meanwhile prices remain as before, say: Ordinary Plate and Tank Iron, 1.95¢ @ 2.05¢; Shell, 2.4¢ @ 2.5¢; Flange, 3.5¢; Fire-Box, 4¢; Steel Plates, Tank and Ship Plate, 2.3¢ @ 2.4¢; Shell, 2.7¢; Flange, 3¢ @ 3½¢; Fire-Box, 3½¢ @ 4½¢.

Structural Iron.—There is no great activity in this department, but there is a fair business nevertheless. Most of the mills have portions of unfilled contracts to work on, and this with a very good current demand keeps them pretty well employed. There is nothing in the near future likely to cause any particular change, although there are the usual hints of good things to come, but the dates not fixed. Prices same as before—viz.: 2¢ @ 2.10¢ for Bridge Plate; 2¢ @ 2.10¢ for Angles; 2.6¢ @ 2.7¢ for Tees, and 3.3¢ for Beams and Channels, Iron or Steel.

Sheet Iron.—The demand for good Sheets is said to be satisfactory, and the entire current output is taken at fair prices. There is the usual pressure to sell inferior qualities at comparatively low prices, but the demand is for the best makes, for which quotations are as follows for small lots:

Best Refined, Nos. 26, 27 and 28.....3½¢ @ 3½¢
Best Refined, Nos. 18 to 25.....3¢ @ 3½¢
Common, ¼¢ less than the above.
Best Bloom Sheets, Nos. 26 to 28....4½¢ @ 4½¢
Best Bloom Sheets, Nos. 22 to 25....4¢ @ 4½¢
Best Bloom Sheets, Nos. 16 to 21....3½¢ @ 3½¢
Blue Annealed.....2.8¢ @ 3¢
Best Bloom, Galvanized, discount.....62½¢
Common, discount.....67½¢

Steel Rails.—There is very little business doing in this market, owing probably to lower quotations at mills further West. Small lots are quoted at \$30 @ \$30.50 at mill, but on firm offers for good-sized lots prices would doubtless be shaded to good buyers, but in the absence of such demand quotations are held as above, \$30 @ \$30.50 at mill.

Old Rails.—No sales have been reported in this market for some time past, but lots for delivery at mills near by have been sold at about \$22. Lots in store or afloat for this port are offered at \$22 @ \$22.50, but at present there are no bids at over \$21 Philadelphia.

Scrap Iron.—Market dull, and prices irregular. Small lots of good quality command about the figures quoted below, but the market will not bear much pressure: Asking prices, \$18 @ \$19 for cargo lots; \$20 @ \$21 for carload lots, delivered, or for choice \$21.50 @ \$22; No. 2 do., \$14 @ \$15; Turnings, \$13 @ \$14; Old Steel Rails, \$19 @ \$20; Cast Scrap, \$14 @ \$15; do. Borings, \$9 @ \$10; Old Fish Plates, \$24 @ \$25. Old Car-Wheels, \$17 @ \$18, Philadelphia, or its equivalent.

Wrought-Iron Pipe.—The improving condition of trade in this department noted last week continues, and manufacturers are meeting with a fair demand. Discounts are quoted as follows: Black Butt-Welded 55 %; on Galvanized do., 45 %; on Black Lap-Welded, 65 %; on Galvanized do., 52½ %; on Boiler Tubes 60 %.

Nails.—There is no change from last week, although in sympathy with the firmer feeling in other departments manufacturers are inclined to stiffen up a little. Lots from store are nominally about \$2.05, with the usual discount on large lots.

Chattanooga.

Office of *The Iron Age*, Carter and 9th Sts.,
CHATTANOOGA, July 30, 1888.

Pig Iron.—All developments during the past week show a decided stiffening up in prices, a much better demand and a general tone of encouragement throughout all the Iron districts of the South. Sales for round lots are being made without much correspondence, and in many instances at 25¢ to 50¢ in advance of the market, as it was a few days ago, and the general opinion appears to prevail that prices will go up at least \$1 before the summer closes. There have been sales of about 7000 tons to remain in the yard, for some of which spot cash has been paid. This appears to be very good evidence that parties who have some surplus in money have confidence that Iron will advance. The quoting prices at which the bulk of sales were made during the past week was \$14 for No. 2, and \$15 for No. 1; at the same time many were made at prices both above and below these figures, therefore, the market could not be quoted as steady.

Miscellaneous.—As the summer advances so also does the prospect of very abundant crops of all kinds develop. The subject of watermelons may not be very proper in this place, yet a few statistics may not be uninteresting. Information obtained from some of the shipping agents shows that so far the E. T., Va. and Ga. line have shipped 850 carloads; the Central System of Georgia, about 2000 carloads; the S. F. and W., about 2700 carloads; the S. C. and Port Royal, about 350 carloads, and from Augusta proper, about 50 carloads, making about 5950 carloads of melons so far this season. To this may be added about half as many more from Western Alabama, Louisiana and Mississippi, making nearly 9000 carloads. These net the grower from \$75 to \$150 per car, or nearly \$1,000,000. The

freight on these melons averages the lines from \$18 to \$35 per carload, or say \$225,000. The special agents who are detailed to look after these shipments state that the acreage will be doubled the coming year.

Cincinnati.

CINCINNATI, July 30, 1888.

Pig Iron.—There has been further improvement in the temper of the local Pig Iron market during the past week. There has been an active inquiry for both Mill and Foundry grades, and while the supply of Foundry has been ample there has been a scarcity of Mill Iron for prompt delivery. The volume of business has been materially increased since the rise commenced, but there is considerable irregularity in quotations. Ohio Irons may be obtained on a lower basis, relatively, than Southern grades, except Silvery and Softeners, but while there are several weak furnaces, the majority are demanding higher prices. Some large contracts have been placed during the week by agricultural works, car-wheel manufacturers and rolling mills, with other contracts in progress. While sales have been more largely of Foundry Irons the reason has been because of the scarcity of Mill Iron for immediate delivery. Silver Gray Iron is reported to be especially abundant, but this condition will probably be but temporary. The sales of both Mill and Foundry grades have been made for delivery during the next six months, and among the sales may be noted 3000 tons No. 1 Southern Coke Foundry at about \$16 @ \$16.50 for long delivery, 2000 tons No. 2 Southern Coke Foundry Iron at \$15.50, and several carload lots at \$15.75, cash, here; 1000 tons No. 1 Southern Mill Iron at about \$14 @ \$14.25, and moderate amounts of No. 2 Mill Iron at \$13.50 @ \$13.75; 2000 tons of Southern Car-Wheel Iron, Hanging Rock, equivalent to \$25, cash, here, and 5000 tons of Lake Superior Charcoal Iron at about \$20 @ \$20.25, cash, Cincinnati. Several 100-ton lots of Mottled Iron have sold at about \$12.75, cash, here. Beyond the confidence and increased volume of business there are no new features. Prices current here, cash, f.o.b., are approximately as follows:

Hot-Blast Foundry.

Southern Coke, No. 1.....	\$16.50 @ \$17.00
Southern Coke, No. 2.....	15.50 @ 16.00
Southern Coke, No. 3.....	14.50 @ 15.00
Ohio Soft Stone Coal, No. 1.....	17.00 @ 17.50
Ohio Soft Stone Coal, No. 2.....	15.50 @ 16.00
Mahoning and Shenango Valley.....	16.50 @ 17.00
Hanging Rock Charcoal, No. 1.....	20.50 @ 22.50
Hanging Rock Charcoal, No. 2.....	19.00 @ 21.00
Tennessee and Alabama Charcoal, No. 1.....	17.50 @ 18.00
Tennessee and Alabama Charcoal, No. 2.....	16.50 @ 17.50

Forge.

Strong Neutral Coke.....	13.50 @ 14.00
Mottled Neutral Coke.....	12.50 @ 13.00
No. 1 Mill Coke.....	14.00 @ 14.50
No. 2 Mill Coke.....	13.50 @

Car-Wheel and Malleable Irons.

Southern Car-Wheel.....	20.00 @ 23.00
Hanging Rock, Cold Blast.....	22.00 @ 25.00
Lake Superior Car-Wheel and Malleable.....	20.00 @ 21.00

Manufactured Iron.—Harmony having been restored among the mills and their workers, there has been more activity on the part of all concerned. Mills have bought more freely and have taken contracts for next year's delivery at about the basis of quotations previously named: Bar and Sheet Iron—Common Bar Iron, 1.90¢ @ 2¢; Charcoal Bar Iron, 2.90¢ @ 3¢; Sheet Iron, Boiled, Nos. 10 to 27, 2.50¢ @ 3.25¢; Sheet Iron, Charcoal, Nos. 15 to 25, 3½¢ @ 4½¢ per lb.

Nails.—There has been a liberal supply of all kinds and only a moderate jobbing trade without change in quotations. Sales of round lots are made from the mills on the basis of 15¢ lower than quotations. Jobbing prices are based upon 12d @ 40d,

which sell at \$2 7/8 keg, with 10¢ rebate in carload lots at mills; 50d @ 60d, 25¢; 10d, 10¢; 8d @ 9d, 25¢; 6d @ 7d, 40¢; 4d @ 5d, 60¢; 3d, \$1, and 2d \$1.50 per keg more. Steel Nails sell at \$2 and Steel Wire Nails at \$2.65 @ \$2.75 7/8 keg.

Old Material.—There has been a more active demand for Old Rails, and some sales of moment have been reported at about \$19.50, cash, here. There has also been an improved demand for Old Wheels, but they have been more freely offered at \$18.50, cash, Cincinnati.

Louisville.

LOUISVILLE, KY., July 30, 1888.

Pig Iron.—The condition of the market during the past week has been about the same as last. Offers have been made quite freely for large amounts of Iron, but furnaces are rather slow in accepting same at present prices. As yet there has been no advance in prices since last week, but from the present outlook we think buyers may expect a slight advance at any moment. We think it advisable for those needing Iron for the balance of the year to buy at prices now prevailing, as, from the present view of the market, there appears to be no prospect of a decline, and indications point strongly to an advance. Placing ourselves in the position of those needing Iron, we would most assuredly take advantage of the present market. Several large Southern furnaces have suspended operations for the present and are unable to state when they will resume. We quote for cash as follows:

Southern Coke, No. 1 Foundry	.....	\$16.00 @	\$17.00
" " No. 2	.....	15.00 @	16.00
" " No. 2 1/2	.....	14.50 @	15.00
Hanging Rock Coke, No. 1 Foundry	.....	16.50 @	17.00
Hanging Rock Charcoal, No. 1 Foundry	.....	20.50 @	22.25
Southern Charcoal, No. 1 Foundry	.....	17.25 @	17.75
Silver Gray, different grades	.....	13.25 @	14.25
Southern Coke, No. 1 Mill, Neutral	.....	12.75 @	13.75
" " No. 2	.....	12.25 @	13.25
" " No. 1 " Cold Short	.....	12.25 @	13.25
Charcoal, No. 1 Mill	.....	13.25 @	14.75
White and Mottled, different grades	.....	12.00 @	12.50
Southern Car-Wheel, standard brands	.....	21.50 @	24.50
Southern Car-Wheel, other brands	.....	18.50 @	20.50
Hanging Rock, Cold Blast	.....	22.50 @	24.50
Hanging Rock, Warm Blast	.....	18.50 @	19.50

Cleveland.

CLEVELAND, July 30, 1888.

Iron Ore.—Prices are a little firmer. The very high grade Ores, which sold two weeks ago for \$5.50 @ \$5.75, are now held at the latter figure although, as a matter of fact, but little of this quality remains unsold. The advance in Lake freights and the scarcity of many of the Bessemer Ores accounts for the stiffening up of the market. Sales of Hematite Ores, just below the Bessemer limit are reported to-day at \$4.60. Sales of non-Bessemer Menominees for Eastern delivery, at figures equivalent to \$3.80, f.o.b. vessels Cleveland, are also made public. It is becoming quite evident that mining companies will have demands for more Ore than they are now prepared to produce. Increased facilities at the mines are being discussed. Gogebic Bessemer are so well sold up that a local dealer is said to have been unable to fill a 25,000-ton order last week, although \$4.80 was offered. Ores from some of the mines in this district have been sold during the past seven days for \$4.70 @ \$4.75. The total shipments to date from the upper Lake ports aggregate 1,650,000 tons, as against 1,825,000 tons shipped up to a corresponding period last year. The Gogebic range has exceeded its shipments of last season by about 375,000 tons. The Norrie and Colby mines will together ship about 500,000 tons; the Ashland and Aurora combined about 250,000 tons, while the other mines in this district are calculated to bring the season's

output up to about 1,225,000 tons. The other ranges will fall below last season's record, the estimated output now being: Gogebic district 1,225,000 tons; Marquette district, 1,400,000 tons; Menominee district, 1,000,000 tons; Vermillion district, 450,000 tons.

Pig Iron.—Prices, although no higher than one week ago, are firmer, and consumers are buying more liberally. The demand at present so far exceeds the production that stocks are clearing up, and better quotations are looked forward to with every degree of confidence.

Manufactured Iron.—Bar Iron is selling at 1.65¢ @ 1.70¢. There is an active inquiry for sheets at 2.70¢ for No. 24 and 3¢ for No. 27. The mills are crowded with orders from bridge builders for special shapes.

Scrap Iron.—Miscellaneous and Wrought Scrap is very dull, extra heavy Axles, however, being in fair demand. Two or three small lots of Old American Rails have sold during the week at \$20.25.

Coke.—The demand is still heavy, with price at the ovens \$1 7/8 ton.

Pittsburgh.

Office of The Iron Age, 77 Fourth Ave.,
PITTSBURGH, July 31, 1888.

The Iron lockout is a thing of the past, but the mills have not all been started up yet, nor have all mill firms signed the scale, but they will be obliged to do so before resuming business. So far as the volume of business is concerned it is increasing, but there is no improvement in prices, and herein is where the great trouble lies. There never was a larger business in raw Iron than there has been during the past two weeks in this district; included in the sales reported were several large blocks. As a rule the improvement in the products succeeds that in the raw article, and consumers generally have been, to some extent, anticipating future wants. The feeling is gaining ground that there will be a large business this fall, but whether it will be sufficiently so to enable mill owners to realize better prices remains to be seen. The reports both from the West and South are very generally favorable, and these reports are not without their effect, as our Pittsburgh manufacturers are largely dependent upon those sections for a market for their products. While the Amalgamated Association managers feel considerably elated over their recent victory, and, not without reason, yet they, as well as the Knights of Labor, have also suffered a number of defeats; the latest one of the latter is the Steel works of Singer, Nimick & Co., which is now a non-union mill; while paying the same wages allowed by other mills, the proprietors refuse to recognize any labor associations; they treat directly with their men. A number of other concerns are running non-union, including the Black Diamond Steel Works, Park, Bro. & Co., Solar Iron Works, Wm. Clarkson, McKeesport Iron Works, W. D. Wood & Co., Edgar Thomson Steel Rail Works, Carnegie, Phipps & Co. and the Natrona Salt Works, each employing a large number of men. It is probable that other manufacturers will do likewise, as soon as they see their way clear. It is not so much the matter of wages as a desire on the part of employers to be free to treat with their employees directly and personally; they want to exercise the right to hire and discharge without dictation from committees of labor associations, and this is one of the strongest reasons for employers breaking loose from these labor organizations.

Pig Iron.—There is no abatement apparently in the demand; sales continue large. Sales of some 30,000 tons have

been reported during the past couple of weeks; however, this was not altogether unexpected, as it was not known that all the mills when they closed down July 1 had little or no stock, and they had to replenish before starting up. While the market is firmer, prices have undergone no change as compared with those of a week ago; some furnacemen are refusing to accept lower rates, but consumers have no trouble in obtaining about all they want. A considerable proportion of the Iron sold during the past couple of weeks was taken by speculators, and will be held at furnaces until there is a market that it can be disposed of at a profit. This is bad for the furnacemen, as this Iron held on speculation is liable to be thrown upon the market at any time. In regard to the stock of Pig Iron in this district in first hands it is not large, and while, as already noted, the market is firmer there is no indication of any immediate boom, as there is a possibility that prices may advance somewhat within the next 30 or 60 days. We quote as follows:

Neutral Gray Forge	.....	\$14.00 @	\$14.35, cash
All Ore Mill	.....	15.00 @	15.50, "
White and Mottled	.....	16.50 @	14.00, "
No. 1 Foundry	.....	16.50 @	16.75, "
No. 2 Foundry	.....	15.75 @	16.00, "
No. 3 Foundry	.....	14.75 @	15.00, "
Charcoal Foundry	.....	21.50 @	24.00, "
Cold Blast Charcoal	.....	25.00 @	28.00, "
Bessemer Iron	.....	17.00 @	17.25, "

Of the 3000 tons of Bessemer reported, 2500 tons were at \$17 cash, and 500 tons at \$17.25 cash—the former may be regarded as the ruling quotation.

Manufactured Iron.—The demand is more active, but with an increasing production prices are no better, and here is the great source of complaint; it is the unremunerative prices that annoy mill owners more than anything else. Some, for this reason, are indifferent about taking new business, and they are making no special effort with this end in view, and the chief object in starting up is to hold their trade, prevent their customers from buying from competitors, realizing as they do that once gone it may not be easy to get them back. We quote prices as a week ago, although it is probable that for very desirable orders Bar quotations are being shaded: 1.70¢ @ 1.80¢ for Bars; Plate Iron, 2.10¢ @ 2.20¢; No. 24 Sheet, 2.70¢ @ 2.80¢, all 60 days, 2 % off.

Muck Bar.—There is more doing, but no improvement in prices, which are regarded by makers as very unsatisfactory, \$26 @ \$26.50, cash. Sale of 1500 tons reported at the outside quotation. Even at the outside price it is claimed that there is little or no margin.

Nails.—There is no improvement to note in this market. Pittsburgh manufacturers are still refusing to sell below the card rate, \$1.90, 60 days, 2 % off for cash, in carlots, but as they are getting no orders it is evident that competitors at other points are selling for less. It is claimed that purchases can be made at \$1.90, delivered at Chicago, equal to about \$1.77 in Pittsburgh. Our manufacturers claim that even at full card rate the margin is small, and that rather than cut below they will not run their factories, and there are but very few Nail machines running here at present.

Wrought-Iron Pipe.—There is but little change to note in the general position of the market, with the exception that Boiler Tubes are firmer and higher; there are comparatively few mills that make Tubes, and this accounts for their having stiffened up while the balance of the list shows no improvement. Discounts may be quoted as follows: on Black Butt-Welded Pipe, 60 %; do., Galvanized, 55 %; Black Lap-Welded, 70 %; Galvanized do., 60 % off; Boiler Tubes, 65 % off; Casing, 35¢ 7/8 foot, net; 2-inch Tubing, 11 1/2¢.

Old Rails.—There is an increased demand, caused by the starting up of the valley mills, where the consumption is always large, and the market is firmer. We can report a number of small sales at \$20.50 @ \$21, cash, mostly at \$21, which may be regarded as the ruling price. It is rumored that valley mills bought a lot of 4000 tons at \$20.50, thus far the rumor has not been confirmed. There have been no foreign Rails sold here for a long time.

Billets, &c.—Bessemer Steel Billets are still quotable at \$28 @ \$28.50, cash, as to size, quality and delivery. Nail Slabs, \$28.75 @ \$28; Domestic Rail Crops, \$17.25 @ \$17.50. Sale 500 tons Foreign Crops at \$23.50. Those making a specialty of Billets are pretty well sold up, and some of them are indifferent about making additional sales, especially for future delivery.

Steel Rails.—Heavy Sections are still quoted at \$31 @ \$31.50, cash, at works, but it is intimated that a desirable order could probably be placed below prices quoted. There have been but few sales reported here recently, but the Edgar Thomson is still running full, working on orders booked some time ago.

Merchant Steel.—No new points have been developed. Business fair. Prices unchanged. Best brands of Tool Steel, 8½¢; Crucible Spring Steel, 4½¢; Crucible Machinery, 5¢; Open-Hearth Steel, 2½¢. As stated elsewhere, the works of Singer, Nimick & Co. are now being operated by non-union men.

Railway Track Supplies.—Prices are weak, and Spikes are lower, being quoted at 2¢, 30 days, delivered: Splice Bars are still quoted at 1.80¢ @ 1.85¢, and Track Bolts at 2.85¢ with square and 2.95¢ with Hexagon Nuts.

Old Material.—There is a rather better demand, but no improvement in prices: No. 1 (railway shop), at \$19, net ton; do., Track Scrap about \$1 less; Car Axles, \$22.50 @ \$23; Cast Scrap, \$14.50 @ \$15, gross; Cast Borings, \$11.50 @ \$12.

Detroit.

WILLIAM F. JARVIS & Co., under date of July 30, report as follows: A most forgotten state of Pig Iron matters seems about to present itself—viz., short supply in makers' hands in certain grades and a decided stiffening on these grades in consequence. The clouds really look as if they were rolling slowly by already. Some buyers are worried to know where they are going to get Iron at old prices, and it is safe to judge they will be more worried before they find the lots they are vainly searching for. Southern Forge Iron, for reasonably prompt delivery, cannot be obtained at any price, while futures would bring from 50¢ to \$1 a ton higher than the lowest 1888 prices to-day. Foundry grades, both Northern and Southern, are more scarce. The buying in all directions has been very large, and this, coupled with the fact of an increased number of stacks out of blast, has caused the very healthy stiffening, which is growing daily. Lake Superior Charcoal Pig is becoming also harder to obtain—smaller stocks on hand and large purchasing—but has not yet assumed its usual position in the van of the advancers. We are pleased to be able to report a strong, healthy market, with quotations firm, as follows:

Lake Superior Charcoal, all numbers.....	\$20.00 @ \$20.50
Lake Superior Coke, all ore.....	19.25 @ 19.75
Lake Superior Coke, cinder mixed.....	18.00 @ 18.50
Standard Ohio Black Band.....	19.25 @ 19.75
Southern Gray Forge.....	15.75 @ 16.25
Southern No. 2.....	17.75 @ 18.25
Southern Silvery.....	17.00 @ 17.50
Jackson County (Ohio) Silvery.....	18.50 @ 19.00
Old Wheels.....	19.00 @ 19.75

New York.

Office of *The Iron Age*, 66 and 68 Duane street, NEW YORK, August 1, 1888.

American Pig.—A number of the local furnace agents report that deliveries are growing heavier, though it does not appear that this is an exceptionally favorable sign, in view of the fact that July is always very light. Low prices continue to be named, and often prove a source of embarrassment, because facts coupled with the quality of the Iron are not always fully stated or appreciated. There is considerable diversity of opinion concerning Virginia and Southern Irons, agents generally insisting that they have little for sale, and that only at full prices, while reports from other sections indicate a continuance of low figures. Thus \$16.25 has been named on No. 2 Southern at Sing Sing, and \$17.25 on No. 1 in Brooklyn. Mahoning Valley Iron continues to be offered at low prices throughout this territory. We hear of Cinder Mixed Northern Iron being offered at \$16.50 for No. 1, tidewater, this being cold short metal, which can be used only for a few special purposes. Standard to choice Northern Irons command, tidewater delivery, \$18 @ \$18.50 for No. 1 Foundry; \$16.50 @ \$17.50 for No. 2 Foundry, and \$15 @ \$16 for Gray Forge.

Scotch Iron.—Some importers claim to observe a slight stiffening, due to an advancing tendency abroad. We continue to quote: Coltness, \$19.50 @ \$19.75; Summerlee, \$19.25 @ \$19.50; Langloan, \$19 @ \$19.50; and Dalmellington, \$18.25 @ \$18.75.

Bar Iron.—The pressure from the West appears to be relaxing slightly, Mahoning Valley mills quoting an advance of \$1 per ton, which puts down Refined from that section here at 1.75¢. We quote for car-load lots, half extras, on dock, 1.60¢ @ 1.65¢ for Common; 1.65¢ @ 1.7¢ for Medium, and 1.75¢ @ 1.8¢ for Refined, with special qualities selling as high as 2¢ @ 2.5¢.

Plates.—Some of the mills decline to name the same prices at which former sales have been made before having been given the opportunity of closely studying specifications submitted. We continue to quote: Tank, 1.9¢ @ 2¢; Shell, 2.15¢ @ 2.30¢; Steel Tank, 2.3¢ @ 2.5¢; Shell, 2.4¢ @ 2.5¢; Flange, 3¢ @ 3.50¢, and Fire-Box, 3.25¢ @ 4½¢.

Structural Iron.—A moderate amount of business is being done, and one of the near-by mills reports that the quantity of Iron turned out during June and July was heavier than any month in its history. Consumers, while buying only from hand to mouth, insist upon a very prompt delivery. A number of Bridge orders have been placed, among them one calling for a 500-ton lot of Iron. We continue to quote: Bridge Plates, 1.9¢ @ 2¢; Universal Mill Plates, 2¢; Angles, 2¢ @ 2.2¢; Tees, 2.5¢ @ 2.7¢, and Channels and Beams, 3.3¢, on dock.

Steel Rails.—Sales during the week aggregate between 10,000 and 12,000 tons in the East, a block having been taken by one mill in Eastern Pennsylvania, which is reported to be an eager seller, partly of stock on hand. The greater part of the Rails sold have been for the South, only one small lot having been taken for Eastern delivery. Prices are on the basis of \$30 at tide-water, equivalent to \$29 @ \$29.25 at Eastern mill, which is now an open quotation. There is some business pending, but, on the whole, the outlook is not considered encouraging, in view of the low prices reached in the West, where, according to good authorities, \$30 has been accepted at Chicago. We note a sale of 30,000 tons by a mill in the Chicago district to the Winona and Southwestern Road, all but 6000 tons for next year's delivery. The

meeting of the Rail Association takes place at the West End Hotel, Long Branch, tomorrow (Thursday).

Old Rails.—There is more inquiry, and, on the whole, a better feeling. We note a sale of 1000 tons of Tees, reported to have been at \$21 on cars, Jersey City. There is some inquiry for Foreign Double Heads, the small stock of which is, however, firmly held considerably above the market.

Fastenings.—The temporary stoppage of a number of the mills has led to an improvement, Spikes selling at \$2.05, delivered, New York, which represents a slight advance. Among the sales we may note one of 15,000 kegs by one mill to another. There are a number of small inquiries on the market. In Angle Bars a better tone has also prevailed, 1.90¢, delivered being asked. Among the sales we note one lot of 800 tons.

Spiegeleisen and Ferro.—The market is entirely nominal. We quote 80 % Ferromanganese, \$49 @ \$49.50.

Billets and Slabs.—No business is reported, except a small lot of foreign Slabs at \$29, ex-ship, bought for re-export.

Wire Rods.—Occasional sales are being made on the basis of \$39.75 @ \$40. Foreign quotations are 104%, Continental shipping ports. Consumers here claim that in view of the wretched condition of the Wire and allied trades they cannot pay present prices for Rods. The prospective heavy grain movement holds out the hope of lower freights for later months.

Financial.

The view is more decidedly confirmed within the last fortnight or so that our leading crops, such as cotton and the cereals, promise a liberal field. At the same time there are indications that the European markets will receive a large proportion of our surplus at remunerative prices. Already this belief is quickening activity in mercantile circles. The reports from the United Kingdom are of bad crop weather and higher prices all round. In the New York grain and provision markets this week toward the close business has been unusually extensive. On Monday fully 18,000,000 bushels of the options were taken at an advance ranging as high as 4¢, and changes in spot stock were no less radical, with many orders to buy. In corn there was strong reaction. Reports from the grain fields say that winter wheat is threshing out better than was expected. The yield of oats, it is thought, will be the largest ever known. In southern Minnesota the harvested winter wheat shows a yield of 30 bushels per acre. The Nashville *American* states that "the wheat yield in Tennessee has probably never been so large as it is the present season. The crop is so unexpectedly heavy that we have the novel spectacle presented of inadequate storage room, vacant rooms in dwellings in many localities being utilized for the purpose." A dispatch from Fort Worth, Tex., says a carefully prepared crop report, covering 150 counties in Texas, shows the quality of wheat, corn, oats and cotton to be good. Wheat has harvested 95 % of an average. Corn will make 34 bushels per acre, which is 105 % of an average. The cotton acreage is 98 %. A New Orleans merchant writes that cotton, sugar and rice all promise better crops than last year, and that a brilliant prospect for trade is opening in all sections of the South. Another says merchants are buying more than usual at this time of the year. The State Board of Agriculture of Iowa issued a crop report July 23, in which they place the condition of corn at 100 %; winter wheat, 95½%; spring wheat, 86. Per contra, the State Board of Agriculture of Indiana report that the

wheat crop in the southern part of the State is a little less than an average. Corn averages 115 %, against 85 % for the last four years. An Ottawa dispatch says Manitoba will have 15,000,000 bushels for export, 25 % more than last year. Perhaps the most hopeful feature of the week was the decision of Judge Brewer that the acts of a State Railroad Commission might properly be inquired into by the courts and made to conform to reason and equity. The iron situation is better, and the tariff is less threatening. The cable war was finally settled on Monday, when the officials of the different companies signed the agreement raising the rate from 12½¢ to 25¢ a word, and making the press rate 10¢ a word instead of 6¢.

The Stock Exchange market on Thursday received an impetus from the announcement of Judge Brewer's decision sustaining the preliminary injunction against the Iowa Commission, which was construed as favorable to the grangers. The State Legislature cannot delegate powers to determine rates under his rulings. A better feeling abroad toward American securities was attributed to the same cause. The coalers were stronger during the week on account of reports of a better business in coal transportation.

United States bonds are quoted as follows:

U. S. 4½s, 1891, registered	107½
U. S. 4½s, 1891, coupon	107½
U. S. 4s, 1907, registered	127½
U. S. 4s, 1907, coupon	127½
U. S. currency 6s	130

The total bonds purchased by the Treasury Department under the circular of April 17th last are as follows: Amount purchased, 4 per cents, \$18,735,500; amount purchased, 4½s, \$8,942,300. Total, \$37,677,800. Cost, 4 per cents, \$23,794,600.58; cost 4½s, \$9,628,678.45. Total \$33,423,279.03.

It is reported that Gen. Roger A. Pryor has been appointed by Governor Hill special counsel for the civil prosecution of the trust corporations. The actions are to be commenced in the Supreme Court of this county, and involve a forfeiture of franchise. In Congress, the House Committee on Manufactures submitted their report concerning the trust investigation, to the effect that the usual form of combinations was devised for the purpose of placing monopolies beyond the reach of existing statutes.

The bank return for the week shows an increase of \$675,775 in surplus reserve, which now stands at \$27,116,175, comparing very favorably with its position one year ago, when the excess was about \$8,000,000. The loans were contracted \$141,900; the specie decreased \$362,200; the deposits other than United States decreased \$2,207,500. Time loans being no longer in favor with institutions generally, funds are being made available for contingencies in case there should be a heavy demand to aid in moving the crops, which is likely soon to occur. Already there is a perceptible hardening at Western points. At Chicago the rate of exchange is down to 25 cents discount, and at St. Louis is at 25 cents premium. It is assumed that the Treasury will readily reduce its surplus by the purchase of bonds or through the depositary banks should occasion arise. The large dry goods failure of last week is followed by that of J. & C. Johnston, on Broadway and Fifth avenue, who are short of cash. The firm obtained an extension upon \$60,000 indebtedness, payable in October. The stock of Levi M. Bates was sold by the Sheriff, at rates fairly good. The market for sterling was weak, and posted rates were reduced to \$4.86 for 60 days' and \$4.88½ for demand. The London Economist, of July 21, says: "As regard the shipments of gold from the United States, the probability is that they cannot be continued. No doubt

the monetary position of the States is distinctly more favorable than it was at this time last year. The Secretary of the Treasury has now been armed with power to buy Government bonds at a premium in order to prevent the accumulation of surplus revenue in the Treasury, and there is no doubt that this power will be freely exercised if necessary. Even under the most favorable conditions that now obtain in the money market it seems much more likely that the States will have to take gold from this side than that they will continue to send the metal here."

The clearings of 38 cities last week were \$818,625,687, a decrease of 4.6 % as compared with the previous year. Outside of New York the clearings were \$309,237,908, an increase of 0.9 %. New York decreased 7.6. In Denver, Omaha, Minneapolis, St. Joseph, Milwaukee and other points in the Northwest there were heavy gains.

The imports of merchandise at this port during the week were large, amounting to \$9,743,000, of which over \$3,000,000 represents dry goods. Since January 1 the total is \$276,414,500, as compared with \$272,395,500 for the same time last year and \$250,326,570 in 1886.

According to the Custom House report the exports of specie from New York last week amounted to \$241,000, and the imports were \$82,000. Since January 1 the exports are \$25,345,800 and the imports \$5,623,500.

It has been determined by the Baltimore and Ohio authorities to immediately complete the connection between their Philadelphia extension and Staten Island via Roselle, on the New Jersey Central.

Metal Market.

Copper.—Opening during the week under review at £81. 5/, spot, Chili Bars wound up in the London market yesterday at £80. 12/6, futures meanwhile going way from £78. 10/ to £70. 15/, the total sales amounting to 200 tons and no more. Here a pool sale is understood to have perfected at 16½¢ for four months, but the exact quantity taken we have been unable to ascertain. It is stated by some that the amount is not large and indicates a falling off in consumption; others on the contrary assert that the Copper has been taken freely. On 'Change the market has been dull and flat, Spot bringing 16½¢ and January 16½¢. Yesterday the nominal quotations were, for spot and August, 16.75¢ @ 16.70¢; September, 16.75¢ @ 16.60¢; and the later months of the year, 16½¢. On July 30 the Calumet and Hecla began hoisting rock from No. 3 Calumet Shaft, making two shafts of the main mine now producing. London arrives 5/ lower this morning with both spot and futures. Good ordinary brands are £73. 5/, and Best Selected £75. 10/. Import of American Copper into Liverpool and Swansea, January 1 to July 16, 15,206 tons Fine, against 5376 tons same time last year. The position and future of the syndicate have led to a great deal of discussion in the papers and circulars, in Europe, and even in pamphlet shape, one of which we review in another column. Messrs. James Lewis & Son, Liverpool, in their circular of July 16 express themselves as follows: "A considerable number of transactions have taken place during the fortnight in Good Merchantable Copper, which includes English Best Select Ingot and Tough Cake; Lake Superior, Oxford and Baltimore Ingots; Wallaroo and Burra Cakes or Ingots; Arizona Pigs of 96 % Cornish assay or over; Lata and Urmeneta Ingots; Japanese Tiles and Chili Bars of 96 % or over. As a sub-committee of the London Metal Exchange has been appointed to frame a form of contract for

Good Merchantable Copper this speculative medium is now practically recognized and will to a considerable extent supplant the business hitherto carried on in Chili Bars. While benefiting foreign smelters of Copper, whose produce has hitherto been very slow and difficult of sale and will now be readily salable, this new departure will, we anticipate, prove very detrimental to the established English smelters, as it will considerably reduce the volume of their business and enable smelting to be carried on in this country with very much less capital than heretofore, thereby inducing increased competition. Much is being said and written as to the probability of an early collapse of the French speculation in Copper. In view of the disastrous results that would at present follow from this—not only to the operators themselves, but also to their guarantors—we do not think it is at all likely to take place, when it is considered that the quantity of Copper now in stock, contracted for and still undelivered must amount to fully 500,000 tons, at an average price of about £65 ½ ton, in addition to about 50,000 tons of Chili Bars in stock and to arrive, costing over £70 ½ ton, and that the abandonment of the speculation now would involve a loss on this of probably £35 and £40 ½ ton respectively. It must be borne in mind that each month the liabilities of the French operators decrease, as part of the Copper contracted for or purchased by them is delivered to consumers and a profit realized upon it. No doubt the quantity of Copper taken by consumers has proved very disappointing to those interested in the speculation, and their unsold stocks have increased to a much greater extent than they anticipated, but consumers must after awhile come to their assistance and take good part, though we do not think they will take all of the Copper arriving. By the end of the year the Copper to be carried will probably amount to over 100,000 tons, but as it is the mutual interest of the French speculators and also of producers that the value of this metal should not fall to a point that would leave a loss on its production and entirely stop the payment of dividends by the different mining companies, the latter may be induced after awhile to diminish their output to an extent sufficient to prevent further accumulation of stocks." A correspondent of the Hamburg *Börsen-halle* dwells on the fact that, at the high prices ruling, the consumption of sheathing Copper for vessels has stopped altogether; that, on the contrary, vessels at present furnish more old Copper, which is sold and the vessels leave unsheathed. Iron vessels being so cheap, vessels using a Copper bottom are hardly built any more in Europe. The correspondent goes on in the same strain, proving the falling off of the Copper demand in other directions, while the supply increases. Matters would be different, he says, if, instead of £80, the syndicate had fixed the rate at £60, at which consumption would not have abated perceptibly in all likelihood. Rio Tinto shares have been actively dealt in on the Paris Stock Exchange last week at 19½ @ 20½ francs.

Tin.—On Thursday of last week the London quotation for spot Tin was £87. 15/, and futures stood £88. 15/; yesterday the former had advanced to £89 and the latter to £89. 10/; total sales, 405 tons. Our own market followed suit, but lacked buoyancy, there being little disposition to operate at the advance, the jobbing demand at the same time being moderate. Sales were made of 145 tons, spot at 20¢; August at 19.90¢; September at 20¢, and October at 19½¢. This morning London comes 5/ lower with both stock and futures. The spot stock in England, Hol-

land and America to-day is 10,023 tons, against 12,697 on July 1, 1888, and 5548 on August 1, 1887. **Tin Plates.**—The demand has continued steady; stocks continue light, and prices are fully sustained at following quotations for large lines on the spot: Siemens-Martin Steel, Charcoal finish, \$4.85 @ \$5.25; ditto Coke finish, \$4.75; Terns, \$4.30 @ \$4.40; Bessemer Cokes, \$4.45 @ \$4.60, and Wasters, \$4.20 @ \$4.25. Coke Tins are selling at 13/3 in Liverpool, for prompt delivery.

Lead.—There being little Lead available in second hands the scarcity of spot caused the market to harden, and the trifling purchases made by consumers, in all about 300 tons, had to be satisfied at a higher range, beginning at 3.95¢ and ending at 4.12½¢, as much as 4.15¢ having been paid, but the actual spot market value to consumers being 4¢ at the close. The chief operator has been pushing prices, and some 700 tons changed hands on the Metal Exchange, August and September at 4½¢ @ 4.17½¢. St. Louis quotes 3.90¢, and Chicago 3.95¢ @ 4¢. In London Soft Spanish has not swerved from £13, while English Pig gave way from £13. 7/6 to £13. 5/. At the Metal Exchange to-day 400 tons August, September and October were sold at 4.17½¢, the last sale being 50 tons August at 4.15¢. Stocks of Lead in Spain are large still, and it is doubtful whether makers over there can agree to reduce production from now forward.

Spelter.—The market for ordinary brands of Domestic has been looking up in consequence of higher prices insisted upon by makers out West, and some business has been transacted at 4½¢, while Silesian remains 5¢, there being a decline in London from £16. 2/6 to £16. Advises by mail from Silesia state that production latterly declined a little, the yield not being as good as it was previously.

Antimony.—Has been moving off regularly in a jobbing way at 9½¢ Hallett, and 13½¢ Cookson.

New York Metal Exchange.

The following sales are reported:

THURSDAY, JULY 26.	
10 tons Tin, September.....	19.00¢
32 tons Lead, spot.....	3.87½¢
48 tons Lead, August, seller's right to double.....	3.90¢
50,000 lb Balto. Copper.....	15.25¢
FRIDAY, JULY 27.	
100 tons Lead, July.....	3.90¢
16 tons Lead, July.....	3.92½¢
16 tons Lead, December.....	4.00¢
MONDAY, JULY 30.	
10 tons Tin, spot.....	20.00¢
10 tons Tin, September.....	20.00¢
25,000 lb Copper, January.....	16.25¢
48 tons Lead, September.....	4½¢
TUESDAY, JULY 31.	
10 tons Tin, August.....	19.90¢
25 tons Tin, October.....	19.50¢
25,000 lb Copper, spot.....	16.75¢
WEDNESDAY, AUGUST 1.	
50 tons Lead, spot.....	4.25¢
132 tons Lead, August.....	4.17½¢
97 tons Lead, September.....	4.17½¢
49 tons Lead, October.....	4.17½¢
81 tons Lead, August.....	4.15¢

Coal Market.

The Anthracite Coal trade is reported as occupying a stronger position. The deliveries under orders given prior to the advance being now quite active, while the wholesale dealers, it is said, refuse new applications at anything below the net circular prices last promulgated. Transactions at the latest advance, however, are as yet comparatively limited. As a whole, the business done in July is said to have exceeded that of any corresponding month on the record, thus reflecting the improved industrial situation, especially so far as relates to the manufacture of Iron. The quantity of coal forwarded to market

during the last few days, as appears from the statistics given below, is not quite so large, at least so far as concerns the Lehigh and Reading districts. Judging from indications the chief operators are well satisfied both with the position and prospects, and as to prices and railroad tolls are content to let "well enough" alone. The several conferences held during the past week having brought about no change in any respect. The promise now is for a steady business during the remainder of the season. The possibility of an advance September 1 is intimated, but of this nothing definite can be said until a contemplated meeting of sales agents, August 15. The Western demand is heavy, but is embarrassed by a lack of transportation facilities. At loading ports vessels have to wait their turn. Freight to Boston are about 85¢ from New York and 90¢ from Philadelphia.

Hard coal rates from Chicago to north-western points have been advanced to \$3.50 per ton, the highest rate ever in effect.

The Anthracite Coal production for the week ended July 28 shows a shortening up compared with the previous week, the total being 824,836 tons, a decrease of 62,500 tons, but for the year to date there is an increase of 255,000 tons, the aggregate from all the mines since January 1 having been 19,608,883, as against 19,353,000 for the same time in 1887. The heaviest receipts of Coal are from the Wyoming region, which shows a growing proportion, amounting last week to nearly 500,000 tons. Quotations are as follows: Wyoming Free Burning, f.o.b. at South Amboy and Weehawken, Broken or Grate, \$3.85; Egg, \$4.15; Stove and Chestnut, \$4.50; Reading Hard White Ash, Chestnut, \$4.40; Stove, \$4.50; Egg, \$4.25, and Broken, \$4.10. The small steam sizes can be bought as low as \$2.40, and Buckwheat, \$2 @ \$2.10 f.o.b.

Bituminous Coal is quiet at \$3.25 per ton, f.o.b. The Cumberland and Clearfield product last week was 125,000 tons, which is a slight increase compared with last year. Since January 1 the total is 3,859,418 tons, an increase of 230,000 tons compared with 1887. It is reported from Philadelphia that the New Jersey Central Railroad has purchased a controlling interest in the Lehigh and Hudson River Railroad, which it will use to aid it in reaching the Poughkeepsie Bridge. Joseph S. Harris, who is vice-president of the Jersey Central, is also president of the Lehigh Valley Coal and Navigation Company, which is under contract with the Lehigh and Hudson River Company to ship a large amount of coal over its road annually.

Old Metals, Rags, &c.

The purchasing prices offered by dealers are as follows:

Heavy Copper.....	¢ lb.	\$0.10 @	.....
Light Copper.....	¢ lb.	@ \$0.08	.....
Copper Bottoms.....	¢ lb.	.....	@ .08
Brass, Heavy.....	¢ lb.	.....	@ .07½
Brass, Light.....	¢ lb.	.....	@ .06
Composition.....	¢ lb.	.....	@ .06½
Lead, Heavy.....	¢ lb.	.....	@ .03½
Tea Lead.....	¢ lb.	.....	@ 2.00
Zinc.....	¢ lb.	.....	@ .03
Wrought Iron.....	ton,	16.00 @	.....
Light Iron.....	ton,	7.50 @	.....
Stove Plate Iron.....	ton,	8.50 @	.....
Machinery Iron.....	ton,	12.00 @	.....
Grate Bars.....	ton,	.....	@ 5.00
Old Rubber Springs.....	¢ lb.	.....	@ .04½
Old Rubber Shoes.....	¢ lb.	.....	@ .01½
White No. 1.....	¢ lb.	.....	@ .02½
White No. 2.....	¢ lb.	.....	@ .01½
Canvas, Linen, No. 1.....	¢ lb.	.....	@ .04
Canvas, Cotton, No. 1.....	¢ lb.	.....	@ .04½
Canvas, No. 2.....	¢ lb.	.....	@ .02½
Seconds.....	¢ lb.	.....	@ .01½
Soft Woollens.....	¢ lb.	.....	@ .06½
Mixed Rags.....	¢ lb.	.....	@ .01
Gunny Bagging, No. 1.....	¢ lb.	.....	@ .02
Jute Butts.....	¢ lb.	.....	@ .02½
Book Stock.....	¢ lb.	.....	@ .01½
Newspapers.....	¢ lb.	.....	@ .007½
Waste Paper.....	¢ lb.	.....	@ .004
Hemp Twine.....	¢ lb.	.....	@ .03
Sisal Baling Rope.....	¢ lb.	.....	@ .03½

British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, August 1, 1888.

The Copper market, while displaying no remarkable activity, has developed more pronounced firmness. Consumers have purchased to a fair extent, and an increased demand has sprung up for cash "warrants." This demand comes mainly from parties who sold three months' futures "short" some time ago, the deliveries on which fall due August 1 and September 1. As in previous months since the syndicate had control, "cash" are found to be scarce just at the time they are most wanted, and the syndicate relieves the scarcity only when the "shorts" bid prices up high enough to make it an object for them to let a few "warrants" out. Hence the gradual rise on prompts from £79. 10/ to £81, while futures have advanced to a very moderate extent only. There have been further large transfers of Chili Bars from Liverpool to France, thus placing supplies more closely than before under complete control of the syndicate and its allies. Business under the new form of contracts, on which Good Merchant Brands are a good delivery, is exceeding that doing in Chili Bars. It is estimated that fully 750 tons have been turned on the new form since the innovation went into force, and syndicate brokers have been most conspicuous among the buyers. Arizona Pig has changed hands to a considerable extent at an average of about £73 during the past week.

Speculation in Pig Tin has been only moderately active, but the transactions in this form, together with quite extensive purchases by consumers, make up a large total business. The dealings have extended through all positions—prompt, 30 days, 60 days and three months' future deliveries—imparting considerable strength to the market. Prices have reacted somewhat the past few days under realizations by speculative holders.

There has been a sharp demand for Bessemer Steel Tin Plates, the spot supply of which is now very light, and the near future output well under the control of orders. Other Coke Plates are also in very good position. This fact coupled with the advance on Pig Tin and reported large orders from the American market causes makers to hold off for still higher prices. An advance has been paid for certain favored brands. Views taken on the American tariff bill have caused considerable stir in the trade, and preparations are said to be making for a larger business. It is stated that prominent parties are selecting sites for new mills and also in treaty with owners of idle works to engage in the manufacture of Plates.

The several branches of the Pig Iron market have continued strong and a further advance in prices all along the line has taken place. The improved statistical position in the Middlesboro' district has been a prominent factor, but a better demand for Scotch and Bessemer Pig has helped to change sentiment and caused heavy buying of "warrants" by brokers to cover recent "short" sales. There seems to be a more or less general belief that prices have touched the lowest point that will be recorded for this year.

The Steel mills in most localities are very busy in nearly all departments on back orders, and new business is coming in to a very encouraging extent in several branches. In fact, the conditions are such that values show a hardening tendency nearly all through.

The demand from Italy for Old Iron Rails seems to have completely died out, and the market for Old Material in general is now decidedly flat.

The average price in the North of England for manufactured Iron the past two months is officially reported as £4. 13/11.

Another new furnace is being erected by the Lynvitondu Works.

Scotch Pig.—Firm market with fairly active demand:

No. 1 Coltness, f.o.b. Glasgow, ...	48/
No. 1 Summerlee, " " " " " "	47 6
No. 1 Gartsherrie, " " " " " "	44 6
No. 1 Langloan, " " " " " "	44 6
No. 1 Cambro, " " " " " "	39 6
No. 1 Shotts, " " " " " "	45/
No. 1 Gienarnock, " " " " " "	43 6
No. 1 Dalmeilington, " " " " " "	40 6
No. 1 Eglinton, " " " " " "	39 9
Steamer freights, Glasgow to New York, 5/; Liverpool to New York, 7/6.	

Cleveland Pig.—Continues strong and selling freely at the advance. No. 1 Middlesboro', G.M.B., 35/6; No. 3 do., 33/.

Bessemer Pig.—Good demand and prices strong. West Coast brands, mixed numbers, 43/ @ 43/6, f.o.b. shipping point.

Spiegeleisen.—Firm market with the demand fair. English 20 % quoted 80/, f.o.b. N. W. England shipping point.

Steel Rails.—Demand still fairly active and prices steady. Standard sections quoted at £3. 17/6, f.o.b. at N. W. England shipping point. Middlesboro' district 2/6 less.

Steel Blooms.—Market quiet but steady. We quote at £3. 12/6 @ £3. 13/ for 7 x 7, f.o.b. at N. W. England shipping point.

Steel Billets.—A fairly good trade at steady prices. Bessemer, 2½ x 2½ inch, £3. 17/6 @ £3. 18/3, f.o.b. at N. W. England shipping point.

Steel Slabs.—Not much doing, but prices steady. Bessemer, £3. 16/3, f.o.b. at N. W. England shipping point.

Steel Wire Rods.—The demand moderate and prices barely steady. Mild Steel No. 6 quoted at £5. 12/6 and No. 5 at £5. 10/, f.o.b. at N. W. England shipping point.

Old Rails.—Very little demand; prices nominal. Tees quoted at £3. 15/, and Double Heads £2. 17/6, c.i.f., New York.

Scrap Iron.—Slow market; prices rather weak. Heavy Wrought quoted at £2. 5/, f.o.b.

Crop Ends.—Market quiet and unchanged. Bessemer quoted £2. 5/ @ £2. 7/6, f.o.b.

Tin Plate.—A good demand, particularly for Cokes, and the market firm. We quote, f.o.b. Liverpool:

IC Charcoal, Allaway grade,	14/6 @ 15/
IC Bessemer steel, Coke finish,	13/ @ 13/3
IC Siemens " " " " " " " " " "	13/3 @ 13/6
IC Coke, B. V. grade,	13/ @ 13/3
Charcoal Terne, Dean grade,	12/6 @ 12/9

Manufactured Iron.—There is a very fair business at steady prices. We quote, f.o.b. Liverpool:

Staff, Ord. Marked Bars,	£ s. d. @ 7 10 0
" " Common " " " " " " " "	4 17 6 @ 5 0 0
" " Bl'k Sheet, singles " " " " " "	6 15 0 @ 6 15 0
Welsh Bars (f.o.b. Wales),	4 12 6 @ 4 15 0

Tin.—Fairly active market, with undertone firm. Straits quoted at £88. 12/6 @ £88. 15/, spot, and £89 @ £89. 5/ for three months' futures.

Copper.—A good business doing, mainly speculative. Market firm. Chili Bars closed at £80. 5/ @ £80. 10/, spot, and £77. 10/ @ £78 three months' futures. Best Selected, £75 @ £75. 10/.

Lead.—Less active demand, and market not so firm. Soft Spanish, £13 @ £13. 5/ at the close.

Spelter.—A fair business at steady prices. Silesian, ordinary, £16 @ £16. 2/6 at the close.

Cost of Crushing Magnetite.

In a paper read by Theodore A. Blake, of New Haven, Conn., before the American Institute of Mining Engineers, the following results are given as having been secured by Blake multiple-jaw crushers and coupling jigs at the new mill of the Chateaugay Ore and Iron Company, at Lyon Mountain, N. Y., on magnetite crushing down to ¼-inch size for separators. The actual amount crushed from September 26, 1886, to January 1, 1888, was 122,814 long tons or 137,551 short tons, at a cost for crushing and concentration of \$42,200.55; or 34.36 cents per long ton, or 30.67 cents per short ton, distributed as follows:

	Total.	Per gross tons.
2018 1836-2240 tons of coal, ...	\$8,612.37	\$0.07
Labor,	21,000.72	.17
Oil waste, &c.,	2,374.30	.02
Mill supplies, renewals, and repairs,	10,205.16	.08
Total,	\$42,200.55	\$0.34

This economy is certainly remarkable, and still more so when we consider the prevailing unfavorable conditions as regards successful screening of the ore. Had the ore been reasonably dry instead of being generally wet and, during the winter months, frozen, or if the crushing after the passage of the 30 x 5 crushers had been "wet" instead of dry and the screening in that way made perfect as it can be, the actual average daily product could have been increased, even doubled, and the cost of crushing and concentrating per ton of crude ore reduced to less than 25 cents.

Filtration of Waste Oil.

Referring to the filtration of waste oil, *Engineering* remarks: The exact nature of the functions exercised by molecules of oil in lubricating surfaces, like many other physical questions, merely leads to hypotheses, without any exact solution which determines what is lubrication. From extended experiments and observations upon the subject, the conclusion has been arrived at that oil in lubricators never "wears out." Its lubricating properties are impaired by holding dust and metal in suspension, by volatilization of the more fluid portions, and by oxidation, but the remaining portion of the oil still performs its original function. The lack of knowledge on the subject of lubrication pertains to how to use oil rather than what oil to use. The separation of oil dripping from heavy journals is easily performed by filtration through a cask of sand or charcoal, with a piece of cloth at the top to remove the coarser impurities. If the lard or sperm oil used has "gummed" to a considerable extent, an admixture of mineral lubricating oil will dissolve much of the thick material, and improve the character of the filtrate as a lubricant.

The fluidity of oil is so much greater at high temperatures that this process is much more satisfactorily accomplished at a temperature of 100° F., and a steam coil may be used to advantage, or the filter may be placed in some warm place; in either case the hazard of fire from spontaneous ignition or from the inflammable vapors arising from the oil must be guarded against by carrying on the work in some cheap shed or suitable place where fire would not result in disastrous consequences. Oil is removed from metal turnings by means of a centrifugal extractor which is surrounded by a steam jacket, and the oil thrown out by the extractor is ready for use on cutting tools, but should be filtered before being used for lubrication. The first centrifugal extractor was designed for the purpose of separating syrup from granulated sugar in the process of sugar manufacture, but to the disappointment of the inventor its use was satisfactory only for a few minutes, after which the syrup would gum upon the perforations in the sides of the revolving cylinder, and prevent its further operation. Numerous experiments in the way of scrapers and other mechanical devices did not remove the difficulty, until a bystander casually remarked that a jet of steam would allow the syrup to flow continuously, and this suggestion led the way to successful operation of the machine.

Electric Carbon Filaments.

Some interesting observations relative to the carbon filaments of incandescent lamps have recently been made. In testing chemically certain filaments said to be of a material other than carbon, Mr. Desmond G. Fitz-Gerald boiled them in strong sulphuric acid, with the view, if carbon were present, of obtaining carbonic oxide and sulphurous acid according to the reaction $H_2SO_4 \times C = CO \times H_2SO_3$. No such reaction occurred, the filaments in question remaining unaltered. Before committing himself, however, to the conclusion that no carbon was present, the experimenter took the precaution of repeating the experiment with filaments known to be of carbon. These filaments also remained unaltered after prolonged boiling in the acid. The result justifies the conclusion that the carbon of the lamp filaments, unlike ordinary carbon, is not acted upon by sulphuric acid at its boiling point. The *Electrical Engineer* says: "It confirms also the conclusion arrived at by Mr. Anthony, that the molecular constitution of a filament of carbon, obtained by heating to a redness a filament of organic matter, becomes modified when the material is subjected for a certain period of time to the comparatively high temperatures obtained by its incandescence as a lamp filament. Mr. Anthony found that this molecular change is indicated by an increase in specific resistance of the carbon. Operating with a new filament, he observed that a diminution in its resistance occurred at a comparatively low temperature, and that the resistance steadily diminished as the temperature was augmented. But after the filament had been allowed to cool, its initial resistance was found to have been augmented. The same fact has been observed by other investigators; but one of Mr. Anthony's results is probably altogether novel. Operating with certain incandescent lamps taking currents of six, eight and ten amperes, and giving luminous intensities of 32, 65 and 125 candles, he found that the resistances of the filaments had appreciably diminished after the lamps had been working for from 200 to 300 hours and that subsequently the resistance steadily increased up to a certain point as the working was continued."

Hardware.

The general tone of the market is rather unsatisfactory, and prices are not regarded as very firm. This impression is strengthened by the fact that there are at the present time several lines of goods the price of which has recently fallen away to a greater or less extent. Buyers are accordingly rather cautious about placing their orders, showing a disposition to hold off, with a view to ascertaining whether or not there are to be further declines. With this exception the condition is regarded as promising well, the general prosperity of the country, the expectation of fine crops and increased activity in some lines, with an improved demand for Hardware, giving promise of a good fall trade. In the opinion of some well-informed parties, prices are likely soon to recover somewhat in tone, and the opinion is expressed that in some lines which are now low and irregular, those who defer purchasing will very likely have to pay something of an advance on present quotations.

Cut Nails.

The New York market remains in the same condition, good brands selling in carload lots at \$1.90 to \$1.95, while outside lots are occasionally offered at concessions. Small lots from store command \$1.95 to \$2. Reports from the West indicate that the proposed Nail pool had suffered a set-back there a week ago, but that now prospects have improved. A meeting of the Western Nail makers is to be held between the 15th and the 20th of the current month. There is little hope that the Eastern makers will enter any arrangement for the present.

Wire Nails.

To-day a new Wire Nail pool goes into effect, to which, it is reported, the leading mills are parties. It is of special interest, since the basis differs radically from the usual method of such associations. In its general outline it is as follows: Monthly reports are made of the quantities sold and the prices realized by each mill. Those who have sold below a fixed standard price pay into the Association a sum equal to the difference in the price realized on the quantity marketed, and the sum which the sales would have fetched at the standard price. The amount thus collected is distributed *pro rata* of sales among the members. Let it be assumed, to illustrate this arrangement, that the standard price is \$2.50, and that six mills have made the following report:

Mill.	Sales.	Price.	Realized
A.....	20,000	\$2.25	\$45.00
B.....	15,000	2.30	30,500
C.....	20,000	2.40	48,000
D.....	25,000	2.50	62,500
E.....	10,000	2.60	26,000
F.....	10,000	2.75	27,500
Total.....	100,000		\$248,500

Under the arrangement A would have to pay \$5000; B, \$3000, and C, \$2000, a total of \$10,000. Redistributing, the result would be:

A.....	\$45,000 - \$5,000 + \$2,000 =	\$42,000
B.....	30,500 - 3,000 + 1,500 =	38,000
C.....	48,000 - 2,000 + 2,000 =	48,000
D.....	62,500 - - - - -	65,000
E.....	26,000 - - - - -	27,000
F.....	27,500 - - - - -	28,500
		\$248,500

It will be seen that the low sellers would not alone suffer from reduced revenue, but would have to be content to have their income cut down still further by paying penalties larger than their share of the sums so collected, while those who hold out for high prices get a bonus besides.

Barb Wire.

The market continues without marked change, but prices on large lots are slightly shaded, while the nominal quotations re-

main as before. The market has been characterized by the dullness usual at this season, but we are now advised of some signs of increased activity.

Washburn & Moen Mfg. Company and I. L. Ellwood & Co., under date July 14, have issued a circular relating to Barb Wire litigation, explaining the recent withdrawal of their application for a temporary injunction against the Braddock Wire Company, to which we have heretofore referred, and stating that the litigation will be earnestly prosecuted.

Miscellaneous Prices.

Coes Wrench Company, Worcester, Mass., issue a price list and circular of their L. Coes's Patent Knife Handle and Mechanics' Wrenches, in which the special features of these goods are alluded to and *fac similes* of their labels given in color. Referring to this line of goods the following joint announcement as to prices and terms is made by the agents, J. C. McCarty & Co., 97 Chambers street, New York, and John H. Graham & Co., 113 Chambers street, New York:

To the Trade: The consolidation and incorporation of Messrs. L. Coes & Co. and A. G. Coes & Co., of Worcester, Mass., under the title of the Coes Wrench Company, renders it necessary for the subscribers to issue a joint circular instead of separately, as heretofore. We are instructed by the new corporation to quote the following prices—viz.: L. Coes & Co.'s Knife Handle Wrench as well as A. G. Coes & Co.'s make, 55 per cent. discount from list.

A special discount of 10 per cent. will be allowed on specified orders for 50 dozen for immediate shipment.

Mechanics' Wrenches will continue to rate at 10 per cent. less than the Genuine, and are subject to same quantity schedule.

Terms 90 days, or 3 per cent. cash 10 days.

Parties having purchased the quantity will be entitled to the extra discount on subsequent orders during the balance of the season ending December 31, 1888.

As both L. Coes & Co.'s Knife Handled Wrench and A. G. Coes & Co.'s pattern are made by the same company the trade can obtain either style from either of the agencies as above. For the convenience of the trade the Coes Wrench Company in their circular state the opening capacity of each size Wrench and contents of cases as follows:

Size Wrench... 4 6 8 10 12 15 18 21 in.
Will open... 1/2 3/4 1 1 1/4 1 3/4 2 1/4 3 1/4 in.
Cases contain... 6 6 6 6 6 3 2 1 doz.

Eagle Carriage Bolts are irregular and considerably lower prices than recently prevailed are now being made.

The competition of outside makers of Horse, Curry and other Cards is more formidable than it has heretofore been, and somewhat lower prices are ruling.

The market for Rope is characterized by exceptional firmness and an advance of 1/2 cent has been made in Manila, while Sisal is held very firmly at ruling prices.

The improved condition of things in Wrought-Iron Pipe, to which we have heretofore referred, still continues, and, while there has been no advance in price, quotations are firmly maintained, and manufacturers are less disposed than formerly to make concessions.

Manufacturers of Squares have advanced the price of No. 1 Iron from \$6 to \$8 per dozen. The discounts which they are making are, however, without improvement, the tendency being apparently toward slightly lower prices. In this line of goods the market is in a decidedly unsatisfactory condition.

The following are the prices in dozen lots of the Peabody Door Spring, described on page 57, and put on the market by A. W. Paine, Peabody, Mass., special prices being made on gross lots.:

	Per gross.
No. 1 for Screen and House Doors.....	\$15
No. 2 for Store Doors.....	18

The Postal Package Company, 34 South Paca street, Baltimore, Md., advise us that the price of their Torches, illustrated on page 185, without sticks or wicks, is \$150 per 1000, with a trade quantity discount.

The following are the list prices of J. F. Wollensak's Lever Latch and Handle, put on the market by J. F. Wollensak, Chicago, Ill. A description of this article was given in our last issue. The list given is subject to a discount of 40 per cent.:

	Per dozen.
No. 102 Polished Brass.....	\$21
No. 102 x 1/2 Nickel Plated Brass.....	24
No. 0102 Japanned Malleable Iron.....	9

There appears to be some uncertainty in regard to some of the list prices on Emery Wheels, as adopted by the Association, some changes having been made or suggested since the meeting of the manufacturers.

Ammunition.

The general situation remains without substantial change, with increasing probability, however, that something will be attempted before long with a view to correcting existing irregularities. While we are advised that the E. C. Meacham Arms Company have not made formal application to the association to be reinstated, they have undoubtedly expressed to influential parties closely connected with the association their desire to be restored to their former position. Whether or not this will be considered feasible or desirable is a question, but the large trade would welcome any action on the part of the association to relieve the situation of its uncertainty and irregularity in prices. The extent to which concessions contrary to the scheme of the association are made by the Special and "A" houses, thus making it feasible for many outside parties to obtain their goods on as favorable terms as if in contract with the association, while they are free to sell at any terms they please, a liberty which they often use to advantage in the conduct of their business, is the real difficulty in the situation. The opinion seems to gain ground among well-informed parties that some recasting of the existing scheme is not improbable, and it is possible that the association may sooner or later take action, by which the large trade will not be given so complete a protection in margins of profit as the present scheme, in too many cases unsuccessfully, endeavors to secure them.

The Alford & Berkele Company,

77 Chambers street, New York, call attention to their specialties in Firearms as follows: Remington's New Line Revolvers, manufactured by E. Remington & Sons; Remington's System Breech-Loading Shotguns, manufactured by Whitney Arms Company; Unique Automatic Revolvers, manufactured by C. S. Shattuck, and Sterling American Bulldogs, manufactured by E. L. Dickinson expressly and exclusively for them. They are also agents for the American Buckle and Cartridge Company, manufacturers of Paper and Shot Shells, and the American Gun Implement Company, manufacturers of Breech-Loading Gun Implements, Fowler's Patent Glass Shells, &c. The following quotations on their specialties in Firearms will be of interest:

Remington No. 3 (Smooth's Patent) Latest Model, New Line.—Octagon Barrel Fluted Cylinder, Patent Shell Ejector, Checkered Rubber Stock, Saw Handle, Flat Butt, five shots; 38 Cal. S. & W. C. F., or 32 S. R. F., 3/4-inch Barrel; weight, 1 pound. Prices: Nickeled, \$3.50; Nickeled, Engraved, \$4.50; Nickeled, Ivory, \$4.50; Nickeled, Pearl, \$5; Nickeled, Ivory Engraved, \$5.50; Nickeled, Pearl Engraved, \$6.

Nos. 1 and 2 Wrought Steel Frame and Barrel in one piece. In all other respects like the above, except in the shape of Stock, and the Calibers, of which No. 1 has 30 Cal., No. 2, 32 Cal. Both rim fire. Prices: No. 1, \$2.25; No. 2, \$2.75; Extra for Ivory Stock, 75 cents;

Extra for Pearl Stock, \$1.13; Extra for Engraving, \$1

Sterling American Bull Dog.—Double action or self-cocking. Weight, 16 ounces; Center fire; five shot; Rubber Stock. Long Fluted Cylinder, Saw Handle, Octagon Barrel, 3½-inch Barrel only; No. 832, 32 Caliber, \$1.65.

Shattuck's "Unique" Revolvers.—Thirty-two Caliber; center fire; Rubber Stock, Saw Handle, Octagon Barrel, Fluted Cylinder, Swing-Out Cylinders, price \$1.75.

S. & W. Model Revolvers—"K. of L."—Thirty-eight Caliber, five shots, Double Action, Safety Hammer, Center Fire, Rubber Saw-Handle Stock, Fluted Cylinder, \$1.75.

British Bull Dog—Rebounding Hammer—"S. & W." C. F. Cartridge, Full Nicked Rubber Stock, All Steel, seven and six shots. Length of Barrel, 2¼ inches; full length, 6 inches; weight, 16 ounces, \$1.50. "Ryan's" New Model Ribbed S. & W. Model Barrel, 32 and 38, \$1.65.

No. 4 New Model Remington.—Round Barrel, Fluted Cylinder, Checkered Rubber Stock, five shot, 38 Caliber, Rim Fire. Length Barrel, 2¼ inches; length Revolver, 6¼ inches; weight, 12 ounces. Steel Barrels, Frames and Cylinders—Prices: Plated, \$2.25; Plated, Engraved, \$3.25; Plated, Ivory, \$3.25; Plated, Pearl, \$3.75.

Shattuck's "Unique" Automatic Revolvers.—Thirty-two Caliber, Rim Fire, Rubber Stock Saw Handle, Octagon Barrel, Fluted Cylinder; Swing-Out Cylinders, price, \$2.10.

Remington System Breech-Loading Single Barrel Shot Guns.—No. 2, Blued Barrel, Walnut Stock, Case-Hardened Mountings, 16 B Gauge, weight, 6½ pounds, 32 inch Barrel, \$7.

They make the following quotations on the goods of the American Buckle and Cartridge Company:

	Discount, per cent.
Paper Shot Shells, IXL, waterproof, 40 and 5	
Paper Shot Shells, special quality, not waterproof.....	40 and 10
Brass Shells, Fowler's patent, 10 and 12 gauge, per hundred.....	\$3.25

The above prices are 60 days, or 2 per cent. for cash in 10 days.

The company also state that they are prepared to fill orders on Ammunition at prices which are always under those of the combination, and that they can supply any make desired, with prompt delivery.

Items.

It is announced that Crowell & Worthington Company have purchased of Tiffany & Co., Providence, R. I., the Hardware business conducted by them for the past 38 years at 72 Weybosset street, where they will continue it as jobbers of Hardware and Tools.

Horton, Gilmore, McWilliams & Co., of Chicago have now got in part of their line of Union Pocket Knives, Shears and Scissors. The total weight of one order received by them last week was 13,000 pounds, which took a gang of 30 floor-men half a day and one night to unpack and arrange on the shelves and the reserve stock floor. Three duplicate orders of the same size are on the way. To accommodate this stock will require shelving 180 feet in length and 10 feet in height. The Pen Knives are being made up for this house in entirely new styles and new patterns, special attention being given to their finish. The blades are marked on both sides of the hilt, the "Union Cutlery Company" appearing on one side and a double knot on the other. The firm are now in the market ready to take orders for these goods. Five traveling men, in addition to those referred to in a previous article, were engaged last week to sell specialties. The largest jewelers' tray factory in Chicago has for the past two weeks been running exclusively on traveling men's sample cases for this firm alone, and the force was insufficient and had to be enlarged to fill the order on time.

A recent issue of the London *Ironmonger* contains the following curious and amusing statement in the letter of its Sheffield correspondent, in regard to the importation of a well-known line of Sheep Shears:

In the United States the firm have also an improved trade, due to a successful stroke on

the part of one of their customers. This gentleman contended that the Shears sent him by Burgon & Wall were wrongly classed at the Custom-House—that they were large Scissors, and not Shears proper. The contention was sustained, and the Shears were admitted as Scissors at 12½ per cent., instead of having to pay the 45 levied on Shears. As the immediate result of this 'cute movement the orders coming to Burgon & Ball from the States increased very considerably.

C. F. Guyon & Co., 97 and 99 Reade street, New York, in their advertisement on page 81 give in an attractive form the names of the different manufacturing concerns for whom they are agents. It will be observed that a number of leading houses are thus represented.

J. T. Henry, Hamden, Conn., issues a circular relating to two new patterns of Pruning Shears. No. 22 is a Ring Shears, with spiral spring without guards, and is described as one of his very best grades. No. 32, his Connecticut Pattern, with spiral springs, and is referred to as a well made, strong, popular and durable Shear.

The following are the terms in which application was made to a Hardware house by a person desiring a position as traveling salesman:

A traveling salesman who can drink rum, play poker, sell a few goods and raise h—generally would like to make a new deal. Have you any use for such a man? Address, "W. O. R. K.," P. O. box —, Boston, Mass.

N. B.—You can secure this man for something less than \$10,000 a year.

It is scarcely necessary for us to say that no engagement was made, and that the application was not regarded as requiring a reply. There is in the Hardware business, as in other lines, but little use for salesmen of the above type, the position of the commercial traveler calling for the best abilities and sterling worth.

The trade will observe the advertisement on page 76, in which the Enterprise Mfg. Company, Philadelphia, Pa., illustrate some of their Mills and call attention to the other goods of their manufacture.

E. Covert Mfg. Company, Farmer Village, N. Y., issue an exceptionally neat and well-printed catalogue of their Neck Yoke Centers, Neck Yokes and specialties in Saddlery, Coach and General Hardware. Among the specialties are to be noticed their Wagon Jack, Umbrella Rack, Adjustable Blotter and others. The catalogue gives a full description of the goods, with illustrations and list prices, which are subject to a general discount of 25 per cent.

A. H. Andrews & Co., 195 Wabash avenue, Chicago, Ill., issue a circular describing Culp's Patent Motor, which is designed especially for show windows. By this contrivance a table or platform containing goods is kept in constant revolution, thus making an attractive display. It is used in some Hardware stores with good effect.

Wm. Bryce & Co. and H. B. Newhall Company played a game of base-ball at Prospect Park last Saturday, July 28. Game was called in the seventh inning, when the score stood 29 to 7. The umpire called the game back to the sixth inning, when the score stood as follows:

Innings.....	1	2	3	4	5	6
W. B. & Co.....	4	5	5	4	4	2—22
H. B. N.....	3	0	2	0	2	0—7

Kerr Bros. & Co., Hicksville, Ohio, besides their regular line of Ash Handles, Cant Hooks, Cant Hook Handles, &c., also make Flag Poles and Campaign Torch Handles and Sticks.

It will be seen from the Special Notice on page 51 that Ryan's Improved Shingling Bracket is offered for sale. This patented device, which has been to a good extent introduced throughout the country,

is referred to as satisfactory in its working. The patentee desires to dispose of it to some party who can manufacture advantageously, perhaps in connection with other goods. A sample of the Bracket can be seen at this office, and Mr. Ryan may be addressed as stated in the advertisement.

It will be observed that Underhill, Clinch & Co., in their advertisement on page 64, call prominent attention to the fact that they carry a stock of Russell Jennings' Auger Bits, and allude also to other lines to which they give a prominent place.

An illustration of Moon's Patent Iron Lever Cutting Box, manufactured by the Wayne Works, Richmond, Ind., is given on page 96. This machine, which has been on the market for some time, is referred to as having given entire satisfaction, and is alluded to for its convenience, comparative inexpensiveness, and the efficiency of its working.

When the late William A. Ives went to New Haven, about 40 years ago, it was with the intention of passing the remainder of his life there without attending to business. He had a moderate fortune, esteemed sufficient for his wants. His active temperament would not, however, allow him to remain idle, and in a few years he became interested in the business of making Boring Implements. For more than 35 years he devoted himself to it without intermission, becoming one of the prominent New England manufacturers. This attention to business was continued to the last, and even on the day before his death he gave specific instructions concerning its future management. An appreciative tribute is paid to his intelligence, character and sterling worth by the Rev. Dr. Munger in an address made at his funeral.

Hibbard, Spencer, Bartlett & Co., Chicago, Ill., have issued, under date July 20, a 20-page price current referring to a varied line of goods—Tin Plate and Metals, Campaign Torches, Cutlery, Apple Parers, Lamps and Lamp Stoves, Axes, Guns, &c.

New Haven Staple Works, New Haven, Conn., in referring to their patent-made Staple, refer to the stiffness given it by the cold drawn process of making, thus allowing the Staples to be driven into harder wood than others without spreading in the bend. Referring further to this matter they say:

What is apparently lost in our Staple through necessity for clinching is offset by the fact of the stock being drawn out ½ inch and over, thus giving a rigid and sharp point for entering the hardest woods, and still retaining malleability enough to be clinched smoothly. Nearly 20 years' experience has enabled us to produce Staples in Iron, Steel, Brass or Copper Wire in either bright, japanned, galvanized or tin finish, and thanking the trade for these years of patronage we hope by persevering application to merit further favors.

Their label represents the pattern of their Staples and contains the motto, "The nimble sixpence is better than the slow shilling."

The trade will observe the advertisement of the Francis Axe Company, Buffalo, N. Y., printed in color and occupying page 68. It represents one of their All Steel Axes, full size, and shows also their Axe Wedge and Axe Bit Stone. The company are making largely All Steel Polished Axes, both etched and labeled, in addition to the Standard Axe. They refer to the fact that low prices are now ruling in Axes, while Steel, Coal, Borax, Emery, Grindstones and Boxes are higher than last year.

"Handy Notes and Queries" is the title of a pamphlet published by Henry Hopkins & Co., 99 Reade street, New York. It contains a variety of useful information relating especially to Hardware, Tinware

and Metals, giving many tables in regard to a variety of matters connected with these lines. It is a pamphlet of 160 pages, and the variety of its subject matter is indicated by the table of contents, which occupies seven pages. A good deal of new matter appears for the first time in this edition.

In their colored page advertisement, occupying page 67, the Shepard Hardware Company, Buffalo, N. Y., illustrate their Shepard's Lightning Quadruple Motion Freezer, and allude to it as the Freezer of the future. The special points that are made in regard to it will interest the trade. At the same time they allude to their Fruit Presses, Blind, Shutter and Gate Hinges, Stove Dampers and miscellaneous goods, calling attention to the variety of manufactures which they put on the market.

We see by one of our exchanges that the Allen & Jemison Company, Tuscaloosa, Ala., have been awarded the contract for furnishing the Lumber, Shingles, Hardware, Cement, &c., necessary to the completion of the locks and dams now being constructed above the city.

By the special notice on page 51, it will be seen that the advertiser, who may be addressed as Meta, *Iron Age* office, desires quotations on 350 gross Tinned Malleable Iron Keys.

L. E. Wright, Douglass, Kansas, announces July 25 that he has sold his Hardware and Implement business to Woodyard & Imus, who are commended to his patrons as his successors.

The Fraim Lock Works, Lancaster, Pa., have appointed C. F. Guyon & Co., 99 Reade Street, New York, as their sole agents for the Middle and Southern States, and Cutler, Woodrough & Co., Boston and Chicago, for the Eastern and Western States, for the sale of their improved Scandinavian Padlocks, to whom orders and inquiries should be addressed. They allude at the same time to the merit of their Jail Padlocks, which are made of malleable iron throughout. The cheaper grades are painted red, with polished shackles and keys. The better grades are put up with flat steel keys, making them susceptible of many changes.

It has recently been charged against the Stanley Rule and Level Company that they are very dull, to be willing to manufacture one tool—called "Odd Jobs"—embracing nearly their whole line; and then sell it for 75 cents. To this the company reply, that all depends on how many of the new tools can be sold. A brisk demand has sprung up already; and it seems likely that carpenters, amateurs and others will buy "Odd Jobs," though they may already own a kit of the separate tools so ingeniously combined in this.

Trade Topics.

The following communication from an enterprising and well known Iowa Hardware house calls attention to the question as to the propriety of charges for box and cartage, and suggests that we open our columns for a discussion of the subject for the purpose of giving retailers an opportunity to express their views, and unite if may be in a protest which will settle the matter. In laying the communication of our esteemed correspondents before our readers we desire to say that we shall be glad to have a thorough discussion of the subject, but in the interest of fair play shall hope to hear from both sides. A full discussion of the question, bringing out the facts in the case, such as the usage of the trade in the matter, the proportion such charges bear to the value of the

goods, whether they more than cover the cost to the shipper of boxes and cartage, and whether or not the retailer in turn realizes anything from the sale of the packages, and such other points, will contribute to the solution of this vexed question. If there are serious difficulties in the way of jobbers and manufacturers acting on the suggestion of our correspondents and including the cost of case and cartage in the prices of goods, we hope this will be pointed out.

We would like to have you open your columns to the retail Hardware dealers from all parts of the country and they in return will all respond on the subject of "Box and Cartage," items which are invariably attached to each and every bill from a jobber, and which in most instances amount to as much or more than the "cash discount" on the bill, and in many cases to 4 or 5 per cent. of the bill. We know the retailers will all let themselves be heard from, and when they have done so we earnestly hope the jobbers will consider the matter. If the jobbers cannot afford to furnish the boxes and teams for conducting their business, then let them add this cost to the cost of the goods, and collect it in an indirect way and not have such items as B. & C. 50¢, B. & C. \$2.60, &c., &c., or Boxes 30, 35, 35, 40, 35, 35. Cartage, 50; Total \$2.60, staring the retailer in the face. Suppose the retailers were to notify a customer after he had purchased a bill of \$4 or \$5 worth of goods that he must pay an additional 10 cents to cover drayage from the depot, wrapping paper, twine, &c., would he get much trade? Why no! That customer would rather go to another store where that amount was figured in with the price and pay 10 cents more for his goods, and not have that infernal charge staring him in the face. Many of the jobbers do not charge for boxing and carting any more, while others are ready to abolish the practice as soon as they can make it unanimous. Now, it only remains for the retailer to make a firm stand, and absolutely refuse to pay it. Come now, brother retailer, join in, let us hear from all of you, and with our united effort we can probably wipe out this yearly expense of from 1 to 5 per cent. of our business.

From Packard & Co., Greenville, Pa., we have the following suggestion in regard to the marking of goods in shipping, which will commend itself to the approval of our readers. The annoyance to which they refer is so easily corrected that it is to be hoped that their suggestion will be acted upon:

We recommend strongly that all shippers of Hardware which is boxed put on the lid plainly

From.....
We are constantly annoyed by a drayload of goods coming in from half a dozen different shippers, which we are unable to distribute in our store and warehouse until opened and the contents revealed. The above precaution would simplify this matter greatly.

In regard to the manner of putting up Hardware in boxes we have the following suggestions from a Pennsylvania Hardware house:

1. Adapt the boxes to the quantities that are best suited to the requirements of the retail trade.
2. Boxes should be made with the strength required for the goods which they contain.
3. All boxes should have the numbers on the labels quite large, so that they may be readily seen in a dark room.

All Hardwaremen are constantly annoyed by neglect of the above essentials in Hardware packages. One-fourth of all goods received arrive in damaged or destroyed boxes.

We lay before our readers the following report of the Louisville Hardware market, which comes to us under date of July 27:

The Hardware business of Louisville, Ky., continues to improve and expand in volume, with no upward movement in prices. There is no trouble in selling wares; they go out fast enough; but the question uppermost with each dealer is whether any profits are realized. There is no doubt about it, some lines of goods are being handled on too small a margin. For instance, take the one article of Cut Nails. Where the wholesale Grocery houses handle nearly as many, in the aggregate, as the Hardware trade, they are used by them as a "go" or leader, frequently being advertised at actual cost, simply to draw the country custom. Some Hardware jobbing houses give instructions to their salesmen to throw Nails in at any price, just so the orders average up well. Speaking further on Nails, just as the trade was settling satisfactorily down to last cut price of \$1.85, delivered, a sudden rupture between the Pittsburgh and Wheeling packets causes a new cut of 2½ cents per keg in freight, making price of \$1.83½ delivered in carload lots of 240 kegs. This may be temporary, however. Dealers who usually buy heavily on the summer rise in the Ohio River for the fall trade are still a little dubious, for fear another unseen factor may cause another cut. Considerable sympathy is, for once, being expressed by the jobbers for the manufacturers in several lines, for, although the mills' statements, so often urged as inducements to buy, of "selling below costs," &c., are not given much credence to, yet there must be a limit to even ductility.

The consumers want cheap goods—the tendency the quality is up to standard—as the provender is to make use of more labor-saving devices; yet even they are satisfied with present prices. The jobbers are anxious for some signs of an advance, and it does seem time for the manufacturers, individually, to call a halt and demand a fair return for money invested in plants.

The Union, Indurated Fibre Company,

37 Barclay street, New York, under date July 20, issue the following schedule of prices, which are designated as jobbers' lowest selling prices for their line of Indurated Fibre ware. Terms net cash 30 days, or 2 per cent. discount for cash in 10 days, f.o.b. cars at factory, or delivered at the New York or Chicago warehouses:

	No. pos.	Per
	perate.	doz.
Pails, Ladies' or Weaver's 6 qt.....1 doz.	\$4.00	
" Buggy or Half, 6 qt.....1	4.00	
" Star (standard, plain) 12 qt.....1	4.50	
" " stenciled "For Fire		
Only.....1	4.50	
Pails, Deck or Mason's, heavy wire		
ball, 12 qt.....1	5.00	
Pails, Railroad or Fire, plain, 14 qt. ¾	5.50	
" " stenciled "For		
Fire Only.....14 qt.....1	5.50	
Pails, Fire, round bottom.....1	5.50	
" Milk or Dairy.....1	5.50	
" Stable, flush bottom, 14 qt.....1	5.50	
" " " " 16 qt.....1	6.00	
" " " " 18 qt.....1	8.00	
" " " " 20 qt.....1	9.00	
Covers for Star or Railroad Pails.....	2.50	
Wash Tubs, No. 0, 23 in.....1	19.50	
" No. 1, 21 in.....1	17.50	
" No. 2, 19½ in.....1	15.50	
" No. 3, 18½ in.....1	13.50	
" No. 0 nest, 4 tubs, Nos.		
0, 1, 2 and 3 (1 nest).....1	16.50	
Wash Tubs, No. 1 nest, 3 tubs, Nos.		
1, 2 and 3 (2 nests).....1	15.50	
Keelers, No. A, 20 in.....1	12.00	
" No. B, 19 in.....1	11.00	
" No. 1, 17½ in.....1	10.00	
" No. 2, 15½ in.....1	9.00	
" No. 3, 13½ in.....1	8.00	
" No. 4, 12 in.....1	7.00	
" Nos. 1, 2, 3 and 4, nested (3		
nests).....1	8.50	
Milk Pans, 10 qt.....3	3.00	
Wash Basins, No. 1, 13½ in.....3	3.00	
" No. 2, 12½ in.....3	2.50	
" No. 3, 11½ in.....3	2.25	
" No. 4, 10½ in.....3	2.00	
With rings 10 cts. per doz. extra.		
Bread Bowls, 13 in.....1	3.00	
" 15 in.....1	4.50	
" 17 in.....1	6.00	
" 19 in.....1	9.00	
" 21 in.....1	12.00	
" assorted, 15, 17, 19 in.		
(4 nests).....1	6.50	
Handy Dishes, No. 1, 8 qt.....1	3.50	
" No. 2, 6 qt.....1	3.00	
" No. 3, 4 qt.....1	2.50	
With one ring or two handles, 25		
cents per dozen extra.		

Vinegar Measures, 2 qt.	16	12.00
" 1 qt.	10	10.00
" Pint.	5	3.00
" Funnel.	5	5.00
" Set, 4 pcs (1 set).	1	3.00
Dry Measures, Half Bushel.	16	12.00
" Peck.	4	7.00
" Half Peck.	2	5.00
" Two Quart.	1	4.00
" Quart.	1	3.00
" Nested, 5 pcs (4 nests).	1	2.50
Spittoons, No. 0, 16 in.	16	18.00
" No. 1, 13 in.	1	8.00
" No. 2, 12 in.	1	6.50
" No. 3, 9 1/2 in.	1	6.00
Slop Jars, No. 0, 5 gal.	14	13.50
" No. 1, 4 gal.	14	12.00
" No. 2, 3 gal.	14	9.00
Chamber Pails, 8 gal.	14	12.00
Hotel Knife Dishes, Style A.	1	7.50
" B.	1	4.00
Champagne Coolers, with Ball or rings as desired; with ball sent unless specified.	1/2	9.00
Champagne Coolers, see "Mosaic Inlay."		
Oval Keelers, No. 3.	1/2	21.00
Water Coolers (crated singly).	Per doz.	
3 gal.		\$24.00
4 gal.		30.00
5 gal.		33.00
6 gal.		36.00
3 gal., with Base.		30.00
4 gal., "		37.00
5 gal., "		41.00
6 gal., "		44.00
3 gal., "Mosaic Inlay," Dec.		36.00
4 gal., "		42.00
5 gal., "		45.00
6 gal., "		50.00
Umbrella Stands (crated singly).		
Dull finish, plain, 9 in. diam., 23 in. deep.	20	20.00
Full " 9 " 23 "	23	24.00
Full " dec., 9 " 23 "	23	27.00
Waste Paper Jars (1/4 doz. in crates).		
No. 1, plain, 10 in. diam., 12 in. deep.	9	9.00
No. 2, " 9 " 12 "	9	7.50
"Pa-Crusta" Decoration.		
Waste Paper Jars (1/4 doz. in crate).		
No. 1, 10 in. diam., 12 in. deep.	17	17.00
No. 2, " 12 "	15	15.50
Umbrella Stand, 9 in. diam., 23 in. deep, crated singly.	36	36.00
"Mosaic Inlay" Decoration.		
Champagne Coolers (1/4 doz. in crate).	30	30.00
Umbrella Stands, 9 in. diam., 23 in. deep.		
Style No. 50, Plain Mahogany.	30	30.00
" No. 75, Ebony or Rosewood.	33	33.00
" No. 100, Ash or Walnut, with panels and Japanese.	36	36.00
Waste Paper Jars, No. 1, 10 in. diam., 12 in. deep.		
Style No. 20, Plain Mahogany.	13	13.50
" No. 25, Two Patterns, Oak.	15	15.00
" No. 40, Japanese or Vine Pattern.	17	17.00
Waste Paper Jars, No. 2, 9 in. diam., 12 in. deep.		
Style No. 20.	12	12.00
" No. 25 - Same as No. 1.	13	13.50
" No. 40.	15	15.50
Round Bottom Fire Pails set in shelves.		
1 doz. pails with shelves, brackets and screws for benches of 2 pails each.	10	10.00
1 doz. pails with shelves, brackets and screws for benches of 3 pails each.	9	9.00
1 doz. pails with shelves, brackets and screws for benches of 4 pails each.	8	8.50

Combinations in England.

In connection with the announcement of a combination formed by the Coffin Furniture manufacturers of England, in which it is stated that the different manufacturers surrendered their separate existences in order to merge them into one large company, the *London Ironmonger* refers to the fact that in these days the favorite remedy for excessive competition and resulting low prices is some agreement among manufacturers to restrict production or to regulate prices. In this instance, however, the pooling is referred to as going beyond these ordinary methods, and so completely has it been carried into effect that the promoters of the enterprise state that the accomplishment of their plans leaves no outstanding competitor. Referring to the matter the *Ironmonger* remarks editorially:

From the point of view of the promoters of the company, therefore, everything is exactly as it should be. All competition is thoroughly extinguished, the interests of all concerned are identical, instead of being at variance, and all the makers will work for the good of their company instead of "slaughtering" prices and cutting each other's business throats by fierce competition. Thus, like the traditional conclusion of a play, "all ends happily." That being so, it is, perhaps, scarcely the right time to suggest that there may be "rifts within the lute" before long. For the moment the company enjoys a monopoly, and, in appealing to the public for capital, is at special pains to prove that that monopoly is a very profitable

one. Unless human nature is very different from what we have always found it to be, we take it for granted that the new company will not long be free from competition. Its very constitution will invite rivalry, and its acknowledged profits may have the effect of making that rivalry formidable. We do not for a moment deny that the directors and the firms who have assented to the amalgamation know their business better than any outsider, yet we are certain that they must have competition. When their competitors arise the company will doubtless endeavor to crush them by lowering prices and other devices usual under similar circumstances. In this the company may succeed—or may fail if the competition is started by strong firms—but it will be at some expense to itself. The process of manufacture is not very intricate or one which needs much capital—hence there is every inducement for firms with capital and connections to go into the business. We express this opinion in no spirit of hostility to the company, of course, but merely because we are by no means convinced of the wisdom, or the advantage to the trade, of the combination. The company will be best judged by their course of action, however, and for that we shall have to wait.

Mineral Product of the United States in 1887.

Dr. David T. Day, Chief of the Division of the Mining Statistics, has submitted to the Director of the United States Geological Survey a summary statement of the mineral product of the United States in 1887, in advance of the official report, "Mineral Resources of the United States, 1887." The total value of the mineral products is \$538,056,345; it shows a wonderful gain over 1886, and is \$100,000,000 greater than the output of 1885. The United States lead the world in the production of minerals. The principal gains in 1887 were in the production of metallic ores and the fuels necessary for smelting them. The production of pig iron alone increased more than \$26,000,000; the high price of copper caused notable expansion in that industry. The product of coal is the largest ever recorded. Taken as a whole, the report shows a year of great prosperity for the mining industry. The great total value of more than \$500,000,000, the report says, resulted not only from an increase in the quantity of minerals mined, but also from a general advance in the prices of metals. It may be several years before this total is exceeded, and the year 1888 will fall considerably below it. Among many reasons for the decrease this year is the decline in railroad building. The principal items of interest concerning each product follow:

IRON. The principal statistics for 1887 were: Domestic iron ore consumed, about 11,300,000 long tons, value at mines, \$33,900,000. This is an increase over 1886 of 1,300,000 tons in quantity and \$5,900,000 in value. Imported iron ore consumed, 1,194,301 long tons; total iron ore consumed in 1887, about 12,494,301 long tons, or 1,454,868 tons more than in 1886. Pig iron made 6,417,148 long tons; value at furnace, \$121,925,800. This is an increase over 1886 of 733,819 tons in quantity and \$20,730,040 in value. Steel of all kinds produced, 3,339,071 long tons, an increase of 776,569 tons over 1886; value at works, \$103,811,000. Total spot value of all iron and steel in the first stage of manufacture, excluding all duplications, \$171,103,000, an increase of \$28,603,000 as compared with 1886. Limestone used as flux in the manufacture of pig iron in 1887, about 5,377,000 long tons; value at quarry, about \$3,226,200.

GOLD AND SILVER.—The total value of gold produced in 1887, according to the mint authorities, was \$33,100,000, a decrease of \$1,900,000 from 1886. Silver increased from \$51,000,000 in 1886 to \$53,441,300 (coining value) in 1887.

COPPER.—Total production 184,670,524 pounds, of which 3,750,000 pounds were made from imported pyrites. The total value was \$21,052,440, at an average of 11.4 cents per pound. The estimated total consumption of copper in the United States increased by about 14 per cent.

LEAD.—The production of lead was 160,700 short tons, valued at \$14,463,000 at \$90 per short ton. The heavy increase of "desilverized" lead from 114,829 short tons in 1886 to 135,552 in 1887 was probably due to the importation of Mexican lode silver ores. The large product of non-argentiferous lead, 25,148 short tons, is due chiefly to the development of the St. Joseph district in Missouri. The production of white lead and the several oxides from pig lead increased to a total of about 75,000 short tons.

ZINC.—The producers' returns show an increase from 42,641 short tons in 1886 to 50,140 in 1887. The price increased to 4 1/2 cents per pound, making the total value in 1887, \$4,782,380. The production of zinc oxide was practically steady at 18,000 short tons, valued at \$1,440,000.

QUICKSILVER.—Production and value increased from 29,981 flasks, valued at \$1,060,000, to 33,825 flasks, valued at \$1,429,000. Except 65 flasks from Oregon, the total supply came from California. The price in 1887 varied from \$36.50 to \$48 per flask in San Francisco.

NICKEL AND COBALT show little change.

ANTIMONY.—The production, all in California, was 75 tons, valued \$15,300—double the production of 1886.

ALUMINUM.—The production of aluminum bronze containing 10 per cent. of aluminum increased to 144,764 pounds in 1887, valued at \$57,905. Other alloys, principally of iron and aluminum, amounted to 42,617 pounds, worth \$17,000. This shows a great demand for these alloys, for it is more than double the product of 1886.

PLATINUM.—Considerable search by dealers produced 448 ounces of crude platinum, valued at \$1838. Part of this came from British Columbia. This is more than has been produced in all previous years taken together.

COAL.—The total output of the mines, including colliery consumption, was: Pennsylvania anthracite, 37,578,747 long tons (increase over 1886, 2,725,670 long tons), or 42,088,197 short tons (increase, 3,052,751 short tons); all other coals, 87,837,360 short tons (increase, 14,129,403 tons); making the total output of all coals from mines in the United States, exclusive of slack coal thrown on the dumps, 129,925,557 short tons (increase, 17,182,154 tons); valued as follows: Anthracite, \$84,552,181 (increase, \$8,433,061); bituminous, \$97,939,656 (increase, \$19,458,600); total value, \$182,491,837 (increase, \$27,891,661). The above figures show a notable increase in 1887 over 1886 in the aggregate output and value of both anthracite and bituminous coal.

COKE.—The total production of coke in the United States for the year ending December 31, 1887, was 7,357,487 short tons, valued at \$15,725,574. This is the greatest product ever reached in the United States, being 1,022,419 tons greater than in 1886.

NATURAL GAS.—The production of natural gas in the United States in 1887 was equivalent to 9,055,000 short tons of coal displaced, value \$13,582,500. In 1886 the corresponding quantity was 6,353,000 tons, worth \$9,847,150.

BUILDING STONE.—Direct returns from producers show a total value of \$25,000,000. This marked increase of \$6,000,000 shows that the statement for 1886 was too small.

BRICK AND TILE.—Value \$40,000,000. This represents an increase of about 13 per cent. in the production of brick and a de-

crease in tile, owing to the drouth in 1887 in Indiana and Ohio. Prices were slightly lower.

LIME.—The production is estimated at 46,750,000 barrels, with an average value of 50 cents per barrel, an increase for the year of 10 per cent.

CEMENT.—The production of cement from natural rock was 6,692,744 barrels, valued at 77½ cents per barrel, making \$5,186,877 as the value of the year's product; increase, \$1,196,877.

PRECIOUS STONES.—The value of American gems in the rough state amounted to \$88,600, besides gold quartz for specimens and gems, valued at \$75,000.

SALT.—Production in 1887, 7,831,962 barrels (of 280 pounds); value, \$4,093,846. The annual production has increased each year since 1883, but the total value has declined, being less in 1887 than in 1884, although only 6,514,937 barrels were made in that year.

BORAX.—Production, 11,000,000 pounds, all from California and Nevada. Total value, \$550,000, at 5 cents per pound for the average grade. The price was rising at the close of 1887.

PYRITES.—Production, 54,500 long tons, valued at \$210,000, at \$46 per ton at the mines.

MINERAL WATERS.—The product which was sold amounted to 8,259,609 gallons, worth \$1,261,473, a slight decrease.

A New Steam Engine Packing.—A new kind of asbestos packing is now being introduced in England, which differs from the ordinary packing in having metal tubes made of a lead alloy running through the center. These tubes impart more strength to the packing than when it is made of asbestos fiber alone. Lead wires have before now been used, to make up for the somewhat brittle nature of the asbestos fiber; but the extra weight of these has been found somewhat objectionable. Tubes are now adopted in preference to solid lead cores, because of their smaller weight. The body of the packing is of asbestos yarn, plaited around the tubes by special machinery, which at the same time threads asbestos fiber through the tubes. The object of filling the tubes with asbestos fiber is that in the event of excessive heating and melting out of the tubes there shall still be a serviceable packing left. Asbestos, when saturated with steam, expands considerably, and the expansion of the inside and outside fibers would fill the space vacated by the metal. The number of tubes varies with the diameter of the packing; an asbestos rope 1 inch diameter has six tubes of $\frac{3}{16}$ inch external diameter inserted. For smaller packings five or four tubes only are used. The packing is being brought out by Messrs. John Bell & Sons, 118 Southwark street, London, S. E.

A Boston paper states: It is gossip that the French syndicate and the copper companies are more likely to renew their contracts for six years at the expiration of the three-year contracts than to break with one another before the present contracts expire. Such gossip is rather faith or opinion than anything else. The present contract runs through 1890, and many things may happen in 29 months.

An English firm, Messrs. Marshall & Co., of Keighley, have brought out what is in a measure a novelty in the engine line, being a triple expansion engine of the semi-portable type. It is of the "underneath" design, with steam-jacketed cylinders, 5½, 9 and 15½ inches in diameter, with 14-inch stroke. The high-pressure cylinder is fitted with automatic cut-off gear. The boiler is of the locomotive pattern. We understand that on trial exceedingly economical results have been obtained with the engine.

The Effect of the Chicago Waterway on Lake Michigan.

The proposed establishment of a navigable waterway between Lake Michigan and the Mississippi River has excited the apprehension of publicists, who fear that the level of the lake would be disturbed, with possibly serious consequences to important navigation interests. At first blush it would seem to be impossible to tap the lake with an outlet taking away 600,000 cubic feet per minute as proposed without affecting the supply of water, enormous as it is. But ex-Senator Doolittle allays all fear on this ground in a recent communication to Senator Sherman which is of general interest. He says that as Lake Michigan and Lake Huron (which latter receives the waters of Lake Superior also) are connected by straits at Mackinaw which are at least three miles wide and have an average depth of more than 100 feet the level of Lake Michigan could not be lowered without lowering the level of Lake Huron. But the Detroit River is the present outlet of Lake Huron, with a width at its narrowest part of 2200 feet and an average depth of 23 feet. The proposed waterway would divert part of this flow to the Mississippi, and it is calculated that 600,000 cubic feet per minute thus diverted would not diminish the flow at Detroit more than one in twenty, or so slight a diminution as to be scarcely perceptible. It would, however, slightly reduce the flow at Detroit rather than cut down the level of Lake Michigan. As to the effect on the Mississippi, Mr. Doolittle says: "It is undoubtedly true that such a flow of water added to the volume of the Mississippi below the mouth of the Illinois, would in times of low water deepen the channel over all the bars a foot or more, and thus improve the navigation of the lower Mississippi more than any other possible improvement. And, as it seems to me, it is equally true that such a waterway between the great lakes and great rivers of the United States would do as much to cheapen and regulate the rates of heavy transportation between the lakes and navigable rivers east of the Rocky Mountains as the Erie Canal now does between the Lakes and the Atlantic seaboard."

A Sheet-Iron Belt.—In the recently issued third edition of Mr. John H. Cooper's book on "The Use of Belting," Mr. John Spiers, of Worcester, Mass., gives the following account of a sheet-iron belt: "A lathe used for turning rolling-mill rolls, compound geared, has a 48-inch pulley. This is driven by an 18-inch pulley on the countershaft, which makes 120 revolutions per minute and is 8 feet from the 48-inch pulley, measured from center to center. Both pulleys are of iron, smoothly turned on the faces. A 7-inch double leather belt was used on these pulleys, but would slip when the turning tool became dull. This belt was replaced by one made of Russia sheet iron, the same as that used for stove-pipes and parlor stoves, and was riveted together in the ordinary way. It was 7 inches wide and 2 inches longer than the leather belt, the extra length making up for the want of elasticity in the iron. During one year's steady run this iron belt could not be slipped even when a heavy cut on a 25-inch roll was taken, which broke a Sanderson steel tool having a section of 2 x 2½ inches, a cutting surface, of 2½ inches, a feed of ¼-inch per revolution and an overhang of 4 inches.

The engineer on the New York Water Works devised an ingenious method for getting through quicksands at the Quaker Bridge dam. In sinking a diamond drill

for the purpose of ascertaining the geological formation a quicksand was encountered which barred further progress. To overcome the difficulty the drill was withdrawn and a very liquid cement poured into the hole. This found its way through the sand, and when set formed a solid column resting on the rock below the quicksand. A second hole driven through this cement pillar passed the troublesome stratum without difficulty.

Power Distribution in Mills.

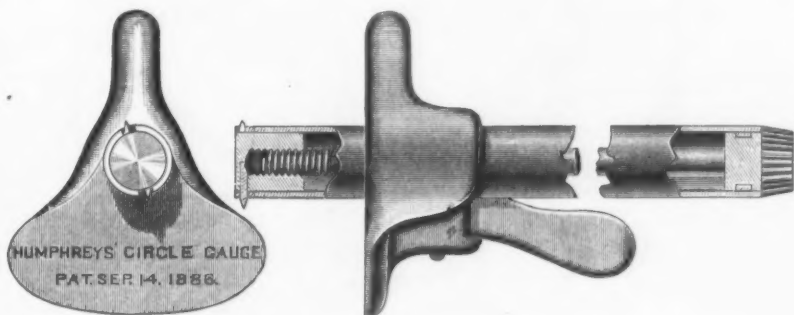
In a recent lecture on "The Evolution of the Modern Mill" delivered at Sibley College Mr. C. J. H. Woodbury remarked that the early form of distribution of power consisted in placing a vertical shaft extending through the whole mill and distributing the power at each story by means of beveled gears, generally of skewed-beveled form. The mechanical defects of such a method of distributing power, with regard to protection, repairs and necessary care, are readily apparent, and there have also been many severe accidents caused by the breaking of teeth in these gears. The present method of distributing power in this country is entirely by lines of belts extending up through what is known as a belt tower, which constitutes an element of great fire hazard to a mill. In some cases the belts are carried from story to story, covered by a casing of wood, and in other instances the tower forms a flue which may be the means of the rapid spread of fire throughout the building.

It would be impossible to arrange the distribution of power in many mills to conform to conditions of safety without reorganizing the whole plant, which would of course be impracticable. But in many instances modifications can be introduced which will diminish the hazard to a great degree. When the pulleys and belting are covered with sheathing in each room the continuity of these flues can be broken by removing this sheathing down to the height of 4 or 5 feet above the floor, so that the covering will merely constitute a physical protection to any one approaching the belting. The best method of arranging the belt tower has been in the case of a mill at Fall River, which was erected upon the ruins of a building destroyed by a fire originating in the belt tower. The machinery is driven by a steam engine situated in an ell projecting from one side at about the middle of the mill, and the main belt communicates to pulleys in a stone masonry tower located directly inside the walls of the main mill, and thence, from pulley to pulley, the power is communicated to each floor by shafting passing through holes left in the tower, and in no instances by means of belts. There is a separate stairway inside of the tower for lubricating the journals, &c., and the top of the tower is covered with skylights protected underneath by a wire netting. In case of a fire in the belt tower the heat will readily break the glass at the top, and the fire will tend to go up and out of the tower rather than through the mill.

According to the *English Mechanic* a black coating for brass objects is made by dissolving 1.05 ounces of carbonate of copper, while being well stirred, in 8.80 ounces of spirits of ammoniac, 17.60 ounces of water being added to the solution. The brass objects should have been well polished with emery paper, and are fastened to brass or copper wires. They are plunged for a short time in the solution, and when completely blackened are rinsed in water. They are then dried in sawdust, and finally rubbed with oil varnish diluted with oil of turpentine. This black coating is said to be durable, and to stand exposure in the open air.

Humphrey's Circle Gauge.

The cut given below represents one of an interesting series of tools which are made by the Humphrey Tool Company, Warren, Mass. This gauge is intended for use in all kinds of wood or metal working where a scratch line is required on straight or curved edges. Its construction is shown in some detail in the illustration, which represents it full size except



Humphrey's Circle Gauge.

in length. As there indicated, it will be seen that the head is held in place by a lever, the operation of which is simple and efficient. The marking tooth, which is made of hardened steel passes through the bar, and emphasis is laid on the fact that the opposite points are always the same distance from the flat face of the gauge on the one side, and from the post on the other, thus making it easy to run a parallel line with the straight edge of the work, and by reversing the tool continue the line around all the curves. A fine adjustment is secured by means of the adjusting screw at the end of the bar. The simplicity and efficiency of this tool, the excellence of the workmanship and finish, and its comparative inexpensiveness, are points which are made in regard to it by the company. For the manufacture of this and other tools the company advise us that their factory is furnished with the most approved machinery, and first-class workmen are employed, so that they refer with confidence to the excellence of their manufactures.

Cline's Fire-Proof Cooker.

We show in the accompanying engraving a form of cooking apparatus recently brought out by the Cline Mfg. Company, of 70 and 72 West Washington street, Chicago, Ill. The engraving represents the device placed in position upon the stove and having the outer casing broken away, showing the internal arrange-



Cline's Fire-Proof Cooker.

ment of parts. The device is made with a vessel of tin supported by an enveloping shield of galvanized iron. The bottom of the cooker is $\frac{1}{4}$ inch from the stove, which allows a circulation of hot air beneath and around the inner vessel of cooker. This arrangement of parts, the manufacturers claim, prevents the food contained

in the vessel from burning. It is made in sizes having a capacity of 2, 3 and 4 quarts, and is adapted for use upon any stove.

Champion Campaign Torch.

The Postal Package Company, 34 South Paca street, Baltimore, Md., are putting on the market the Champion Campaign Torch herewith illustrated. It is made of tin on

in 100 parts of water, then when the blue color has entirely disappeared under the action of the potash, and a yellowish color has taken its place, they are immersed in a solution of four parts of tannin, also in 100 parts of water; then washing them again we obtain prints whose tone may be assimilated to that of pale writing ink.

New Indurated Fibreware.

The Union Indurated Fibre Company, 37 Barclay street, New York, are offering as new lines Oval Keelers shown in Fig. 1, which are referred to as serviceable for foot-baths, dish-pans, &c. Another addition to their house-furnishing line is shown in Fig. 2. These chamber pails are, it will be observed, a different shape from their slop jars. They are described as

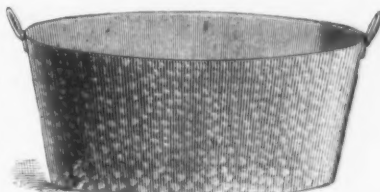


Fig. 1.—Oval Keeler.

superior to tin or galvanized iron in being inodorous, and as cheaper in the end, while as compared with earthenware they are not liable to breakage. The company have also added to their line of stable buckets 18 and 20 quart sizes, as they have had calls for these large buckets. They are described as of approved pattern and suited for heavy work. The champagne cooler which they have lately offered in their regular finish, they are now furnishing in their mosaic inlay decoration, a finish to the attractiveness of which they allude. Their lines of measures are now complete, and are offered in the regular nests of five, including quart and 2-quart. The demand for these measures, both wet and dry, has exceeded the ex-



Champion Campaign Torch.

washer which rests on the flange of the can, and on which the top is seated when screwed down, rendering the torches, it is claimed, absolutely oil-proof. It will be observed that the burner is provided with a drip cup, to avoid soiling the clothes of those carrying the torches. The point is also made that this torch can be filled with exceptional rapidity. It is stated to have a capacity sufficient to burn four hours. Besides being admirably adapted as a campaign torch, it is also referred to as suitable for engineers, firemen, railroad men and others working about machinery.

According to *La Nature* blue prints may be given the black tone by plunging them into a solution of 4 parts of potash



Fig. 2.—Chamber Pail.

pectations of the company, and customers are obliged to wait their turn in the filling of orders. The demand will, however, soon be met, as additional machinery for turning out these goods is being rapidly put in operation.

Buffalo has begun to take prominence as an ore receiving and shipping port. A new ore dock, the Minnesota, was recently opened there, and the old docks are still undergoing improvements. Contracts have been closed for the construction and equip-

ment of a large dock on the Blackwell Canal, to be used for receiving iron ore from lake vessels. H. K. Wick, of Youngstown, Ohio, who is largely interested in coal and iron ore at Ohio ports, is at the head of the scheme. Room will be had for the storage of 100,000 tons of ore. The contracts call for the completion of 400 feet of dockage, with hoisting apparatus, railway tracks and switches by August 9. Four Brown hoists, which will have the capacity to take out 1000 tons of ore a day, will first be erected. Later two others will be added, giving the dock facilities for the unloading of 1500 tons daily.

New Package for Liquid Glue.

The Le Page Glue and Cement Company, Gloucester, Mass., are putting up W. N. Le Page's improved glue in a new style of can, which is represented in the accompanying illustration. The special feature of this can is the fact that the cover is not screwed on, but fits snugly and is held in place by a brace or catch, as



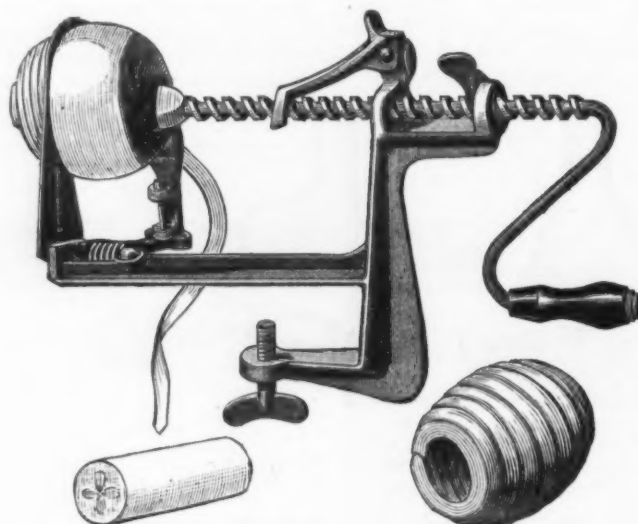
W. N. LePage's Liquid Glue.

shown in the cut. The brush is inserted, as indicated, through the top of the cover, in the usual manner.

Hudson's New '88 Apple Parer, Corer and Slicer.

The accompanying illustration represents this machine, which is manufactured by C. E. Hudson, Leominster, Mass. It is of a similar design to the Little Star, manufactured by the same house, and is alluded to as doing excellent work, although it does not possess all the advantages claimed for the Little Star, which the manufacturer regards as of exceptional merit, referring especially to the fact that the parings and juice from the apple do not fall upon the machine to gum and clog it. The New '88 is a cheaper parer than the Little Star, and is designed for a class of trade calling for low-priced goods, and is put on the market more particularly to meet cheaper machines offered by other manufacturers. The simplicity of the construction of this machine is emphasized, while it is claimed that its work is exceptionally satisfactorily performed. It pares, cores and slices the apple, and pushes the core from the fork. The edge of the paring knife is not made round, as has heretofore been done, and consequently it does not gouge into the apple, taking off more of the fruit than the skin. This new slicing and coring knife is described as so arranged that the fruit is less liable to be broken from the fork than in other parers.

The slicing knife is made of one piece of steel. The machine has a steel crank shaft and screw-tinned cast-steel slicing knives and crankshaft, and other novel features. It is claimed that it will operate on larger and softer fruit than other parers, and is alluded to in tastiness of appearance,



Hudson's New '88 Parer, Corer and Slicer.

finish, durability and good work as having advantages over other parers of its class.

Electric Patent Pruner.

The Mechanics Mfg. Company, New Bedford, Mass., are putting on the market a new pruner, which they have named the Electric. It is represented in the illustration herewith given, which shows quite clearly its special features. It will be seen that the chisel or cutting knife has a rack, which gears into a toothed segment, which is operated by a lever or arm which is cast as a part of it. To this the cord is attached, passing down to the person using the pruner. The efficiency of this implement and its convenience in use will be appreciated by the trade. These pruners are made in two sizes. No. 1, 10½ inches



The Electric Patent Pruner.

in length, 1½ inches wide; weight, 17½ ounces. It is intended for cutting branches up to ½ inch in diameter. The larger size, No. 2, is 12 inches long, 1½ inches wide and weighs 27 ounces. It will cut branches ¾ inch in diameter. With each pruner is included a line and ball handle for the same, the whole being neatly packed in a wooden box with sliding cover.

The Quick Meal Torch.

The Ringen Stove Company, of St. Louis, Mo., are directing the attention of the trade to their Quick Meal gasoline torch, a general view of which is shown in the engraving presented herewith. This

torch is of simple construction, and represents the results of several years' careful consideration of the requirements of the trade in this direction. The general arrangement of the parts is clearly indicated in the engraving, which shows the torch with the burner lighted. The reser-



The Quick Meal Gasoline Torch.

voir has a capacity of 5 quarts. The flame is claimed to be bright, clear and full, and will not blow out in the strongest wind. The makers claim that the flame given by this torch is larger than that of any similar construction. The torch is especially adapted for foundries, markets, shops, and also in places where it is exposed to the weather. The company propose to push it, and endeavor to make it as well known as the Quick Meal cooking stove.

CURRENT HARDWARE PRICES.

AUGUST 1, 1888.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers at the figures named.

Ammunition.

Caps, Perfection, 1000—	
Black & Goldmark's	
F. L. Waterproof, 1-10's	50¢
B. B. Trimmings, 1-10's	25¢
B. B. Ground Edge, Central Fire, 1-10's	25¢
Double Waterproof, 1-10's	1.40
Musket Waterproof, 1-10's	50¢
G. D.	25¢
S. B.	30¢
Union Metallic Cartridge Co.	
F. C. Trimmings	50¢
F. L. Ground	25¢
Can. Fire Ground	70¢
Double Waterproof	1.40
Double Waterproof, in 1-10's	1.40
A. B. Genuine Imported	45¢
Wiley's E. B.	55¢
Wiley's D. Waterproof, Central Fire	1.00

Cartridges—	
Rim Fire Cartridges	dis 50¢ to 52¢
Rim Fire Military	dis 15¢ to 25¢
Central Fire, Pistol and Rifle	dis 25¢ to 52¢
Central Fire, Military & Sporting	dis 15¢ to 52¢
Blank Cartridges, except 22 and 32 cal., an additional 10% over above discounts.	
Blank Cartridges, 22 cal.	dis 1.75, dis 2
Blank Cartridges, 32 cal.	dis 35¢, dis 2
Primed Shells and Bullets	dis 16¢ to 25¢
B. B. Caps, Round Ball	dis 1.75, dis 2
B. B. Caps, Conical Ball, Swaged	dis 2.00, dis 2

Primers—	
Berdan Primers all sizes, and B. L. Caps for Sturtevant Shells	dis 1.00, dis 2
All other Primers, all sizes	dis 1.20, dis 2

Shells—	
First quality, 4, 8, 10 and 12 gauge, dis 25¢ to 52¢	
First quality, 14, 16 and 20 gauge (10 list)	dis 35¢
Star, Club, Rival and 10 gauge, 10 list	dis 35¢
Climax Brands, 12 gauge, 10 list	dis 10 2
Club, Rival and Climax Brands, 14, 16 and 20 gauge	dis 30¢ to 52¢
Seibold's Combination Shot Shells	dis 15¢ to 2
Brass shot Shells, 1st quality	dis 60¢ to 2
Brass Shot Shells, Club, Rival and Climax	dis 60¢ to 2

Shells Loaded—	
List No. 19, 1887	dis 20¢ to 10

Wads—	
C. M. C. & W. R. A.—B. E., 11 up	dis 2.00
U. M. C. & W. R. A.—B. E., 9 & 10	dis 2.30
U. M. C. & W. R. A.—B. E., 7 & 8	dis 2.60
U. M. C. & W. R. A.—P. E., 11 up	dis 3.10
U. M. C. & W. R. A.—P. E., 9 & 10	dis 4.00
U. M. C. & W. R. A.—P. E., 7 & 8	dis 4.90
Wiley's B. L., 11 up	dis 1.75
Wiley's P. E., 11 up	dis 2.80

Avails—	
Avails—	
Peter Wright's	dis 2.40
Armstrong's House	dis 2.40
Armstrong's House	dis 2.40
Trouton	dis 2.40
Wilkinson's	dis 2.40
J. & Riley Carr. Patent Solid	dis 1.10

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Avails, Brad Mts, &c.

wis, Sewing, Common	gross \$1.70—dis 35¢
wis, Shouldered Peg	gross \$2.45—dis 40¢ to 40¢ 10
wis, Patent Peg	gross \$3.85—dis 40¢ to 40¢ 10
wis, Shouldered Brad	gross \$2.70—dis 35¢
wis, Handled Brad	gross \$7.50—dis 45¢
wis, Handled Scratch	gross \$7.50—dis 35¢ to 10
wis, Socket Scratch	gross \$1.50—dis 25¢ to 30¢

Awl and Tool Sets.

'Ken's Sets, Awls & Tools, No. 20	dis 50¢ to 10
'Ray's Ad Tool Hds., Nos. 1, 12, 2, 12, 3, 12, 4, 12	dis 25¢ to 25¢ 10
'Miller's Falls Adj. Tool Hds., Nos. 1, 12, 2, 12, 3, 12, 4, 12	dis 25¢ to 25¢ 10
'Henry's Combination Haft	dis 25¢ to 25¢ 10
'Brad Sets, No. 42, 10.50, No. 43, 12.50	dis 70¢ to 10¢ 5
'Brad Sets, Stanley's Excelsior, No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	dis 30¢ to 10
'Brad Sets, Stanley's Excelsior, No. 3, 35.50	dis 30¢ to 10

Axes.

Makers and Special Axes—	
First quality	dis 20.00 to 25.50
Others	dis 20.00 to 25.50

Axe Granes.

Fraser's, in bulk.....	keg \$ 3, 40; Pail, \$ 1, 00 net
Fraser's, in boxes....	gross \$9.50
Dixon's Everlasting, in bxs., \$ doz., 1 b: \$1.20; 2 b, \$2	
Dixon's Everlasting.....	10-b pails, each, 85¢
Lower grades, special brands.....	\$ gro \$5.50 @ 87

Axes—No. 1, 4¢ to 4¢; No. 2, 5¢ to 5¢.

No. 7 to 13	dis 50¢ to 55¢
No. 19 to 29	dis 60¢ to 10¢ 70
Standard Wrought Steel Tubular Self-Oiling	dis 33¢ to 42¢
Standard Farm (1 to 5) and Special Farm (1 to 5)	dis 33¢ to 42¢
Over 10 sets	dis 33¢ to 42¢
Strong Exp. (6 to 9), & XX Strong Truck (10 to 16)	dis 33¢ to 42¢
Less than 10 sets	dis 33¢ to 42¢
Over 10 sets	dis 33¢ to 42¢

Bag Holders.

Sprengle's Pat., 7 doz \$18.	dis 60¢
Balance—Spring Balances	dis 50¢
Common 24¢	dis 1.50—dis 50¢
Challion's Spring Balances	dis 50¢
Challion's Circular Spring Balances	dis 60¢

Bells.

Light Brass	dis 70¢ to 10
Extra Heavy	dis 60¢ to 10
White Metal	dis 60¢ to 10
Silver Chime	dis 50¢ to 10
Globe (Cone's Patent)	dis 25¢ to 35¢

Doors.

Gong, Abbe's	dis 25¢ to 35¢
Gong, Yankee	dis 40¢ to 10
Gong, Barton's	dis 40¢ to 10
Frank, Taylor's	dis 25¢ to 10
Frank, Brook's	dis 40¢ to 10
Frank, Cone's	dis 10¢
Frank, Cone's	dis 20¢ to 10
Lever, Sargent's	dis 60¢ to 10
Lever, Taylor's Bronzed or Plated	dis 25¢ to 10
Lever, Taylor's Janned	dis 25¢ to

World's Best. # gross, No. 1, \$12.00; No. 2, \$24.00.
No. 3, \$36.00. \$12.00, \$24.00, \$36.00
Universal. \$12.00, \$24.00, \$36.00
Domestic. \$12.00, \$24.00, \$36.00
Champion. \$12.00, \$24.00, \$36.00

Cards.

Horse and Curry. \$10.10 @ 10.10 @ 10.10
Cotton. \$10.10 @ 10.10 @ 10.10
Wool. \$10.10 @ 10.10 @ 10.10

Carpet Sweepers.

Cast Steel, Polished. \$12.25
Cast Iron, Steel Points. \$12.25
Socket. \$12.25
Bullard's. \$12.25 @ 12.25 @ 12.25

Carpet Sweepers.

Bissell No. 5. \$17.00
Bissell No. 7 New Drop Fan. \$19.00
Bissell Grand. \$36.00
Grand Rapids. \$36.00
Crown Jewel. No. 1, \$18; No. 2, \$19; No. 3, \$20
Magie. \$16.00
Jewel. \$17.00
Mystic. \$18.00
Cottage. \$18.00
Garland. \$18.00
Parlor Queen. \$18.00
Housewife's Delight. \$18.00
Queen. \$18.00
Queen, with hand. \$18.00
King. \$18.00
Weed Improved. \$18.00
Hub. \$18.00
Cog Wheel. \$18.00

Cartridges—See Ammunition.**Casters.**

Red. \$12.25 @ 12.25 @ 12.25
Plate. \$12.25 @ 12.25 @ 12.25
Shallow Socket. \$12.25 @ 12.25 @ 12.25
Deep Socket. \$12.25 @ 12.25 @ 12.25
Yale Casters, list May, 1888. \$12.25 @ 12.25 @ 12.25
Yale, Gem. \$12.25 @ 12.25 @ 12.25
Martin's Patent (Phoenix). \$12.25 @ 12.25 @ 12.25
Payson's Anti-friction. \$12.25 @ 12.25 @ 12.25
"Giant" Truck Casters. \$12.25 @ 12.25 @ 12.25
Stationary Truck Casters. \$12.25 @ 12.25 @ 12.25

Cattle Leaders.

Humason, Beckley & Co.'s. \$12.25
Sargent's. \$12.25
Hotchkiss. \$12.25
Peck Stow & W. Co. \$12.25

Chains.

Trace 6-10-2, exact sizes, # pair, \$1.05 @ 1.05 @ 1.05
Trace 6-10-3, exact sizes, # pair, .90 @ .90 @ .90
Trace 7-10-2, exact sizes, # pair, 1.11 @ 1.11 @ 1.11

NOTE.—Traces, "Regular" sizes 34 net # pair less than exact.

Log, Fifth, Stretcher, and other fancy Chains, list Nov. 1, 1887. \$12.25 @ 12.25 @ 12.25
American Coil 3-10 1/2 5-10 1/2 7-10 1/2 8-10 1/2
In cask lots, 8.75 6.25 5.00 4.50 4.00 3.75 3.50
Less than cask lots, add 1/4 @ 1/4 @ 1/4
German Coil, list of June 20, 1887. \$12.25 @ 12.25 @ 12.25
Ger. Halter Chain, list of June 20, 1887. \$12.25 @ 12.25 @ 12.25

Covert Halters.

Covert Halters, Hitching and Breast. \$12.25
Covert Traces. \$12.25
Oneida Halter Chain. \$12.25
Galvanized Pump Chain. \$12.25
Jack Chain, Iron. \$12.25 @ 12.25 @ 12.25
Jack Chain, Brass. \$12.25 @ 12.25 @ 12.25

Chalks.

White. \$12.25 @ 12.25 @ 12.25
Red. \$12.25 @ 12.25 @ 12.25
Blue. \$12.25 @ 12.25 @ 12.25
White Crayons. \$12.25 @ 12.25 @ 12.25

Chisel Lines—See Lines.**Chisels.**

Socket Framing and Firmer—
P. S. & W. \$12.25 @ 12.25 @ 12.25
New Haven and Middlesex. \$12.25 @ 12.25 @ 12.25
Merrill. \$12.25 @ 12.25 @ 12.25
L. & J. White. \$12.25 @ 12.25 @ 12.25
Wetherby and Douglass. \$12.25 @ 12.25 @ 12.25

Chucks.

Beach Patent. \$12.25 @ 12.25 @ 12.25
Morris's Adjustable. \$12.25 @ 12.25 @ 12.25
Danbury. \$12.25 @ 12.25 @ 12.25
Syracuse, Balis Pat. \$12.25 @ 12.25 @ 12.25

Clamps.

Providence Tool Co.'s Wrought Iron. \$12.25
Adjustable, Gray's. \$12.25
Adjustable, Lambert's. \$12.25
Adjustable, Snow's. \$12.25
Adjustable, Hammer's. \$12.25
Adjustable, Stearns'. \$12.25
Stearns' Adjustable Cabinet and Corner. \$12.25
Cabinet, Sargent's. \$12.25
Carriage Makers'. \$12.25
Eberhard Mfg. Co. \$12.25 @ 12.25 @ 12.25
Warners'. \$12.25 @ 12.25 @ 12.25
Saw Clamps. \$12.25 @ 12.25 @ 12.25

Clips.

Norway, Axle, 1/2 & 5-16. \$12.25 @ 12.25 @ 12.25
Second grade Norway Axle, 1/2 & 5-16. \$12.25 @ 12.25 @ 12.25
Superior Axle Clips, 5-16. \$12.25 @ 12.25 @ 12.25
Norway Spring Bar Clips, 5-16. \$12.25 @ 12.25 @ 12.25
Wrought Iron Felice Clips. \$12.25 @ 12.25 @ 12.25
Steel Felice Clips. \$12.25 @ 12.25 @ 12.25
Baker Axle Clips. \$12.25 @ 12.25 @ 12.25
Lockeyes. \$12.25 @ 12.25 @ 12.25

Cocks, Brass.

Hardware list. \$12.25 @ 12.25 @ 12.25

Coffee Mills.

Box and Side, list revised Jan. 1, 1888. \$12.25 @ 12.25 @ 12.25
American, Enterprise Mfg. Co. \$12.25 @ 12.25 @ 12.25
The "Swift," Lane Bros. \$12.25 @ 12.25 @ 12.25

Compasses, Dividers, &c.

Compasses, Calipers, Dividers. \$12.25 @ 12.25 @ 12.25
Bemis & Call Co.'s Dividers. \$12.25 @ 12.25 @ 12.25
Bemis & Call Co.'s Compasses & Calipers. \$12.25 @ 12.25 @ 12.25
Bemis & Call Co.'s Wires & Inside or Outside. \$12.25 @ 12.25 @ 12.25
Bemis & Call Co.'s Double. \$12.25 @ 12.25 @ 12.25
Bemis & Call Co.'s (Call's Patent Inside). \$12.25 @ 12.25 @ 12.25
Excelsior. \$12.25 @ 12.25 @ 12.25
J. Stevens & Co.'s Calipers and Dividers. \$12.25 @ 12.25 @ 12.25

Copers' Tools.

Bradley's. \$12.25 @ 12.25 @ 12.25
Barton's. \$12.25 @ 12.25 @ 12.25
L. & J. White. \$12.25 @ 12.25 @ 12.25
Albertson Mfg. Co. \$12.25 @ 12.25 @ 12.25
Beatty's. \$12.25 @ 12.25 @ 12.25
Sandsky Tool Co. \$12.25 @ 12.25 @ 12.25
Corkscrews. \$12.25 @ 12.25 @ 12.25
Humason & Beckley Mfg. Co. \$12.25 @ 12.25 @ 12.25
Clough's Patent. \$12.25 @ 12.25 @ 12.25
Howe Bros. & Hubert. \$12.25 @ 12.25 @ 12.25

Corn Knives and Cutters.

Bradley's. \$12.25 @ 12.25 @ 12.25
Wadsworth's. \$12.25 @ 12.25 @ 12.25
Cradles—Grain. \$12.25 @ 12.25 @ 12.25
Crew Bars. \$12.25 @ 12.25 @ 12.25
Cast Steel. \$12.25 @ 12.25 @ 12.25
Iron, Steel Points. \$12.25 @ 12.25 @ 12.25

Curry Combs.

Fitch's. \$12.25 @ 12.25 @ 12.25
Rubber. \$12.25 @ 12.25 @ 12.25
Perfect. \$12.25 @ 12.25 @ 12.25

Curtain Pins.

Silvered Glass. \$12.25 @ 12.25 @ 12.25
White Enamel. \$12.25 @ 12.25 @ 12.25

Cutlery.

Beaver Falls and Booth's. \$12.25 @ 12.25 @ 12.25
Wostenholme. \$12.25 @ 12.25 @ 12.25

Dampers, &c.

Dampers, Buffalo. \$12.25 @ 12.25 @ 12.25
Buffalo Damper Clips. \$12.25 @ 12.25 @ 12.25
Crown Damper. \$12.25 @ 12.25 @ 12.25
Excelsior. \$12.25 @ 12.25 @ 12.25

Dividers—See Compasses.**Dog Collars.**

Embossed Gilt, Pope & Stevens' list. \$12.25 @ 12.25 @ 12.25
Leather, Pope & Stevens' list. \$12.25 @ 12.25 @ 12.25
Brass, Pope & Stevens' list. \$12.25 @ 12.25 @ 12.25

Drill Bits.

Torrey's Rod, regular size. \$12.25 @ 12.25 @ 12.25
Gray's. \$12.25 @ 12.25 @ 12.25
Bee Rod. \$12.25 @ 12.25 @ 12.25
Warner's No. 1, # doz, \$1.50; No. 2, \$1.30. \$12.25 @ 12.25 @ 12.25
Gem (Coll), list April 19, 1888. \$12.25 @ 12.25 @ 12.25
Star (Coll), list April 19, 1888. \$12.25 @ 12.25 @ 12.25
Victor (Coll). \$12.25 @ 12.25 @ 12.25
Champion (Coll). \$12.25 @ 12.25 @ 12.25
Philadelphia. \$12.25 @ 12.25 @ 12.25
Cowell's. No. 1, # doz \$1.80; No. 2, \$1.50, \$1.25 @ 12.25 @ 12.25
Rubber, complete. \$12.25 @ 12.25 @ 12.25
Hercules. \$12.25 @ 12.25 @ 12.25
Shaw Door Check and Spring. \$12.25 @ 12.25 @ 12.25
Elliott's Door Check and Spring. \$12.25 @ 12.25 @ 12.25

Drawing Knives.

P. S. & W. \$12.25 @ 12.25 @ 12.25
Merrill. \$12.25 @ 12.25 @ 12.25
Wetherby and Douglass. \$12.25 @ 12.25 @ 12.25
Watrous. \$12.25 @ 12.25 @ 12.25
L. & J. White. \$12.25 @ 12.25 @ 12.25
Bryce's. \$12.25 @ 12.25 @ 12.25
Adjustable Handle. \$12.25 @ 12.25 @ 12.25
Wilkinson's Folding. \$12.25 @ 12.25 @ 12.25

Drills and Drill Stocks.

Blacksmith's. \$12.25 @ 12.25 @ 12.25
Blacksmith's Self-Feeding. \$12.25 @ 12.25 @ 12.25
Bumast, P. S. & W. \$12.25 @ 12.25 @ 12.25
Breast, Wilson's. \$12.25 @ 12.25 @ 12.25
Breast, Millers Falls. \$12.25 @ 12.25 @ 12.25
Breast, Bartholomew's. \$12.25 @ 12.25 @ 12.25
Ratchet, Merrill's. \$12.25 @ 12.25 @ 12.25
Ratchet, Ingersoll's. \$12.25 @ 12.25 @ 12.25
Ratchet, Parker's. \$12.25 @ 12.25 @ 12.25
Ratchet, Whitney's. \$12.25 @ 12.25 @ 12.25
Ratchet, Weston's. \$12.25 @ 12.25 @ 12.25
Ratchet, Moore's Triple Action. \$12.25 @ 12.25 @ 12.25
Whitney's Hand Drill, Plain, \$1.00, Adjustable. \$12.25 @ 12.25 @ 12.25
Wilson's Drill Stock. \$12.25 @ 12.25 @ 12.25
Automatic Boring Tools. \$12.25 @ 12.25 @ 12.25

Drill Bits.

Drill Bits—See Augers and Bits.
Drill Chucks—See Chucks.
Dropping Pans.

Drop Pans.

Small sizes. \$12.25 @ 12.25 @ 12.25
Large sizes. \$12.25 @ 12.25 @ 12.25

Drop Pans.

Drop Pans. \$12.25 @ 12.25 @ 12.25

Drop Pans.

Drop Pans. \$12.25 @ 12.25 @ 12.25

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Fluting Machines.

Knox, 4 1/2-inch Rolls. \$12.25 each @ 12.25 @ 12.25
Knox, 6-inch Rolls. \$12.25 each @ 12.25 @ 12.25
Eagle, 5 1/2-inch Roll. \$12.25 @ 12.25 @ 12.25
Crown, 4 1/2 in., \$3.50; 6 in., \$4.00; 8 in., \$5.50 each, \$12.25 @ 12.25 @ 12.25
Crown Jewel. \$12.25 @ 12.25 @ 12.25
American, 5 in., 6 in., \$3.40; 7 in., \$4.50 each, \$12.25 @ 12.25 @ 12.25
Domestic Fluter. \$12.25 @ 12.25 @ 12.25
Gove's Hand Fluter, White Metal. \$12.25 @ 12.25 @ 12.25
Crown Hand Fluter, No. 1, \$15; 2, \$12.50; 3, \$10.50 @ 12.25 @ 12.25 @ 12.25
Shepard Hand Fluter, No. 85. \$12.25 @ 12.25 @ 12.25
Shepard Hand Fluter, No. 110. \$12.25 @ 12.25 @ 12.25
Shepard Hand Fluter, No. 95. \$12.25 @ 12.25 @ 12.25
Clark's Hand Fluter. \$12.25 @ 12.25 @ 12.25
Combined Fluter and Sad Iron. \$12.25 @ 12.25 @ 12.25
Buffalo. \$12.25 @ 12.25 @ 12.25

Fluting Machines.

Fluting Machines. \$12.25 @ 12.25 @ 12.25

Fluting Machines.

Fluting Machines. \$12.25 @ 12.25 @ 12.25

Fluting Machines.

Fluting Machines. \$12.25 @ 12.25 @ 12.

Climax Steel Anti-Friction..... dis 50
 Zenith for Wood Track..... dis 55
 Reed's Steel Arm..... dis 50
 Challenge, Haru Dcor..... dis 50
 Sterling Improved (Anti-Friction)..... dis 50
 Victor, No. 1, \$15; No. 2, \$10.50; No. 3, \$12..... dis 50
 Cheritree..... dis 50
 Kidder..... dis 50
 The "Boss"..... dis 50
 Best Anti-Friction..... dis 50
 Duplex Wood Track..... dis 50
 Terry's Patent..... dis 50
 Cronk's Patent..... No. 4, \$12; No. 5, \$14.40; No. 6, \$18..... dis 50
 Wood Track, Iron Clad..... \$ ft. 104, dis 50
 Carrier Steel Anti-Friction..... dis 50
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 Fellix..... dis 50
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 Lane's Steel Anti-Friction..... dis 50
 The Ball Bearing Door Hanger..... dis 50
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 Stearns' Anti-Friction..... dis 50
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 Faultless..... dis 50
 American..... dis 50
 Rider & Wagoner, No. 1, \$25; No. 2, \$20..... dis 50
 Paragon, Nos. 1, 2 and 3..... dis 50
 Crescent..... dis 50
 Nickel Cast Iron..... dis 50
 Nickel, Malleable Iron and Steel..... dis 50
 Scranton Anti-Friction Ring's Strap..... dis 50
 Scranton Anti-Friction Double Strap..... dis 50
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 Wild West, 4 in. wheel, \$15; 5 in. wheel, \$21..... dis 50
 Harness Chains—See Snaps.
 Hatchets—List Jan. 1, 1888..... dis 50
 Isaiah Blood..... dis 50
 Hunt's Shingling Lath and Claw..... dis 50
 Hunt's Broad..... dis 50
 Buffalo Hammer Co..... dis 50
 Hurd's..... dis 50
 Fayette R. Plumb..... dis 50
 Wm. Mann, Jr., & Co..... dis 50
 Underhill Edge Tool Co..... dis 50
 Underhill's Haines and Bright goods..... dis 50
 C. Hammond & Son..... dis 50
 Simmons..... dis 50
 Kelly's..... dis 50
 Sargent & Co..... dis 50
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 Carter's Needle..... dis 50
 Heath's..... dis 50
 Hinges..... dis 50
 Wrought Iron Hinges—
 Strap and T..... dis 50
 Screw Hook and Eye..... dis 50
 Strap..... dis 50
 Heavy Welded Hook..... dis 50
 Screw Hook and Eye..... dis 50
 Rolled Blind Hinges, Nos. 23 and 34..... dis 50
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 Geer's Spring and Blank Butts..... dis 50
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 Barker's Double Acting..... dis 50
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 Gate Hinges—
 Western..... dis 50
 N. E. Reversible..... dis 50
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 N. Y. State..... dis 50
 Automatic..... dis 50
 Common Sense..... dis 50
 Seymour's..... dis 50
 Shepard's..... dis 50
 Reed's Latch and Hinges..... dis 50
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 Parker..... dis 50
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 Nicholson..... dis 50
 Huffer..... dis 50
 Clark's, Nos. 1, 2, 3, 4 and 50..... dis 50
 Clark's Mortise Gravity..... dis 50
 Sargent's, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13..... dis 50
 Sargent's, No. 12..... dis 50
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 Shepard's Notched 81 para. Buffalo, "Champion"..... dis 50
 Steamboat, Clark's Old Pattern and Clark's Tip Pattern..... dis 50
 Shepard's O. B. Lull & Porter..... dis 50
 Shepard's Acme, Lull & Porter..... dis 50
 Shepard's Queen City Reversible..... dis 50
 Clark's Lull & Porter, Nos. 9, 1, 14, 2, 3, 4..... dis 50
 North's Automatic Blind Hinges, No. 2, for Wood, \$10.50; No. 3, for Brick, \$13.50..... dis 50
 Hoes..... dis 50
 Garden, Mortar, &c..... dis 50
 Planter's, Cotton, &c..... dis 50
 Warren Hoe, Scott Pattern..... dis 50
 Magic..... dis 50
 D. & H. Scovill..... dis 50
 Lane's Crescent Scovill Pattern..... dis 50
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 Sandusky Tool Co..... dis 50
 Hubbard & Co..... dis 50
 Bare..... dis 50
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 "Moore's" Differential Pulley Block..... dis 50
 Holders, File and Tool..... dis 50
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 Asate and Granite Ware..... dis 50
 Rustless Hollow-Ware..... dis 50
 Galvanized Tea-Kettles..... dis 50
 Steel Pinned—4 mo. or 5 1/2 inch in 30 days..... dis 50
 Reed & Barton..... dis 50
 Meriden Britannia Co..... dis 50
 Simpson, Hall, Miller & Co..... dis 50
 Rogers & Brother..... dis 50
 Hartford Silver Plate Co..... dis 50
 William Rogers Mfg. Co..... dis 50
 Hooks..... dis 50
 Cast Iron..... dis 50
 Bird Case, Reading..... dis 50
 Clothes Line, Sargent's list..... dis 50
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 Ceiling, Sargent's list..... dis 50
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 Wrought Iron..... dis 50
 Cotton..... dis 50
 Cotton Pat. (N. Y. Mallet & Hand)..... dis 50
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 Wrought Staples, Hooks, &c..... dis 50
 Bench Hooks..... dis 50
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 Belt..... dis 50
 Grass..... dis 50
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 Capewell..... dis 50
 Star..... dis 50
 Anchor..... dis 50
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 N. Y. B. & P. Co. Extra..... dis 50
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 Blair's Adjustable..... dis 50
 Blair's Adjustable Chopper..... dis 50
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 Novak's Ice Breakers..... dis 50
 Dunlap's Ring Picks..... dis 50
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 Ice Mallets, Pick in handle..... dis 50
 Ice Axes, Small Cast or Mail..... dis 50
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 Picture, Judd's..... dis 50
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 Standard List..... dis 50
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 Lanterns..... dis 50
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 Tubular, Lift Wire, with Guards..... dis 50
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 Without Guards, 25¢ dozen less..... dis 50
 Police, Small, \$5.00; Med. \$7.25; Large, \$9.75..... dis 50
 Lemon Squeezers..... dis 50
 Porcelain Lined, No. 1..... dis 50
 Wood, No. 2..... dis 50
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 Jennings' "Star"..... dis 50
 Dean's..... dis 50
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 King..... dis 50
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 Cotton and Linen Flah, Draper's..... dis 50
 Draper's Chalk..... dis 50
 Draper's Mason's Linen, 84 ft., No. 1, \$1.25; No. 2, \$1.75; No. 3, \$2.25; No. 4, \$2.75; No. 5, \$3.25..... dis 50
 Livingston & Key Latches..... dis 50
 Samson, Cotton Key Latches..... dis 50
 Silver Lake, Braided, No. 0, \$0.00; No. 1, \$0.50; No. 2, \$1.00; No. 3, \$1.50; No. 4, \$2.00; No. 5, \$2.50..... dis 50
 Mason's Linen, No. 3, \$1.50; No. 4, \$2.00; No. 5, \$2.50..... dis 50
 Mason's Colored Cotton..... dis 50
 Fire Cloths, No. 12, \$3.00; No. 13, \$3.50; No. 14, \$4.00..... dis 50
 Ventilator Cord, "Union Braided, White or Drab"..... dis 50
 Cotton..... dis 50
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 Yale Corrugated Key..... dis 50
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 Yale new list..... dis 50
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 "Champion" Night Latches..... dis 50
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 Eureka, Eagle Lock Co..... dis 50
 Romer's, Nos. 0 to 91..... dis 50
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 "Champion" Padlocks..... dis 50
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 "Star"..... dis 50
 "Horse Shoe"..... dis 50
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 Lumber Tools..... dis 50
 Ring Peavies, "Blue Line" Finish..... dis 50
 Ring Peavies, Common Finish..... dis 50
 Steel Socket Peavies..... dis 50
 Wall, Iron Socket Peavies..... dis 50
 Cast Hooks, "Blue Line" Finish..... dis 50
 Cast Hooks, Common Finish..... dis 50
 Cast Hooks, Wall, Socket Clasp, "Blue Line" Finish..... dis 50
 Jant Hooks, Wall, Socket Clasp Common Finish..... dis 50
 Jant Hooks, Clip Clasp, "Blue Line" Fin..... dis 50
 Jant Hooks, Clip Clasp, Common Finish..... dis 50
 Hand Spikes..... dis 50
 Pike Poles, Pike & Hook, 12 ft., 14 ft., 16 ft., 18 ft., 20 ft..... dis 50
 Pike Poles, Pike only..... dis 50
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 Setting Poles..... dis 50
 Wamp Hooks..... dis 50
 Landing Blocks..... dis 50
 Skidding Tongues..... dis 50
 Log Binders..... dis 50
 Banded Boot Calks, 1 to 5 M, dis 25; 5 to 10 M, dis 30
 Square Steel Boot Calks..... dis 50
 Chain Raising Dogs..... dis 50
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 Timber Grapples..... dis 50
 Lastre..... dis 50
 Four-ounce Bottles..... dis 50
 Mallets..... dis 50
 Hickory..... dis 50
 "Anavite"..... dis 50
 B. & L. Block Co., Hickory and L. V..... dis 50
 Match Safes..... dis 50
 Dangerfield's Self-igniting..... dis 50
 Mattecks—Regular list..... dis 50
 Meat Cutters..... dis 50
 Dixon's—Nos. 1, 2, 3, 4..... dis 50
 Woodruff's..... dis 50
 Champion..... dis 50
 Hales' Pattern Nos. 11, 12, 13..... dis 50
 American..... dis 50
 No. 1..... dis 50
 No. 2..... dis 50
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 Enterprise..... dis 50
 No. 10..... dis 50
 No. 20..... dis 50
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 No. 60..... dis 50
 No. 70..... dis 50
 No. 80..... dis 50
 No. 90..... dis 50
 No. 100..... dis 50
 No. 110..... dis 50
 No. 120..... dis 50
 No. 130..... dis 50
 No. 140..... dis 50
 No. 150..... dis 50
 No. 160..... dis 50
 No. 170..... dis 50
 No. 180..... dis 50
 No. 190..... dis 50
 No. 200..... dis 50
 No. 210..... dis 50
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 No. 230..... dis 50
 No. 240..... dis 50
 No. 250..... dis 50
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 No. 270..... dis 50
 No. 280..... dis 50
 No. 290..... dis 50
 No. 300..... dis 50
 No. 310..... dis 50
 No. 320..... dis 50
 No. 330..... dis 50
 No. 340..... dis 50
 No. 350..... dis 50
 No. 360..... dis 50
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 No. 380..... dis 50
 No. 390..... dis 50
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 No. 420..... dis 50
 No. 430..... dis 50
 No. 440..... dis 50
 No. 450..... dis 50
 No. 460..... dis 50
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 No. 490..... dis 50
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 No. 520..... dis 50
 No. 530..... dis 50
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 No. 560..... dis 50
 No. 570..... dis 50
 No. 580..... dis 50
 No. 590..... dis 50
 No. 600..... dis 50
 No. 610..... dis 50
 No. 620..... dis 50
 No. 630..... dis 50
 No. 640..... dis 50
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 No. 770..... dis 50
 No. 780..... dis 50
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 No. 800..... dis 50
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 No. 870..... dis 50
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 No. 890..... dis 50
 No. 900..... dis 50
 No. 910..... dis 50
 No. 920..... dis 50
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 No. 940..... dis 50
 No. 950..... dis 50
 No. 960..... dis 50
 No. 970..... dis 50
 No. 980..... dis 50
 No. 990..... dis 50
 No. 1000..... dis 50

Pennsylvania.....dis 40¢10¢
 No. 1.....dis 24.00 28.00 28.00
 Miles' Challenge, Nos. 1 2
 \$ dos. \$22.00 30.00 40.00—dis 45¢45¢10¢
 Home No. 1.....dis 26¢ 26¢ 26¢
 Draw Cut, Nos. 1 2 3 4 5 6 7 8
 \$ dos. \$50.00 75.00 80.00 225.00—dis 20¢ 25¢
 Beef Shavers (Enterprise Mfg. Co.).....dis 20¢10¢ 20¢
 Chadborn's Smoked Beef Cutter.....\$ dos. \$98.00

Mining Knives.
 Am. (3d quality), \$ gro, 1 blade, \$7; 2 blades, \$12; 3 blades, \$18.
 Lothrop's.....dis 20¢10¢
 Smith's, \$ dos, Single, \$2.00; Double, \$3.....dis 40¢45¢
 Knapp & Cowles.....dis 50¢10¢40¢
 Buffalo Adjustable.....\$ dos. \$3.00, dis 25¢

Melasses Cutters.—Stebbins' Pat. dis 70¢70¢ 71¢
 Stebbins' Genuine.....dis 60¢10¢10¢
 Stebbins' Tinned Ends.....dis 40¢10¢
 Chase's Hard Metal.....dis 50¢10¢
 Nash's.....dis 30¢
 Lincoln's Pattern.....dis 20¢10¢
 Wood's.....dis 20¢10¢

Saw Nos. 1 2 3 4
 \$7.00 8.00 9.00 10.00, \$ dos. dis 60¢10¢10¢

Money Drawers.—\$ dos., \$18 to \$20.

Muzzles.—Safety, \$ dos. \$3.....dis 25¢

Nails.—See Trade Report

Wire Nails & Brads, list July 14, '87.....dis 70¢10¢
 Wire Nails, Standard Penny.....\$ keg, \$2.50 to \$2.60

Nail Puller.—Curtis Hammer.....\$ dos. \$0.00 net
 Giant, No. 1.....\$ dos. \$0.00, dis 10¢
 Pelican.....\$ dos. \$0.00, dis 25¢
 Boss.....\$ dos. \$0.00, dis 30¢

Nail Sets.—Square.....\$ gro., \$4.00 to \$4.25

Round.....\$ gro., \$3.25

Cannon's Diamond Point.....\$ gro. \$12 dis 20¢

Nut Crackers.

Table (Humason & Beckley Mfg. Co.).....dis 40¢

Blake's Pattern.....\$ dos. \$2.00, dis 10¢

Turner & Seymour Mfg. Co.....dis 50¢

Nuts.

Nuts, all kinds, 5¢ off list Jan. 1, 1888.

In lots less than 100 lb, \$ lb, add 1¢, 1 lb boxes add 1¢ to list.

Oakum.

Government.....\$ lb 5¢

U. S. Navy.....\$ lb 7¢

Navy.....\$ lb 6¢

Oilers.—Zinc and Tin.....dis 65¢ 65¢10¢

Brass and Copper.....dis 60¢10¢50¢10¢

Valuable, Hammers' Improved, No. 1, \$3.00, No. 2, \$4.00; No. 3, \$4.40 \$ dos. dis 10¢ 10¢10¢

Valuable, Hammers, Old Pattern, same list.....dis 40¢

Prior's Patent or "Paragon" Zinc.....dis 60¢10¢10¢

Prior's Patent or "Paragon" Brass.....dis 50¢

Oliver's Tin and Zinc.....dis 60¢

Oliver's Brass and Copper.....dis 60¢

Broughton's Zinc.....dis 60¢

Broughton's Brass.....dis 60¢

Packing, Steam.

Rubber.

Standard.....dis 60¢10¢ 60¢10¢10¢

Extra.....dis 50¢10¢ 60¢

N. Y. B. & P. Co., Standard.....dis 50¢10¢25¢

N. Y. B. & P. Co., Empire.....dis 70¢

N. Y. B. & P. Co., Salamander.....\$ lb 65¢, dis 30¢

Jenkins' Standard.....\$ lb 80¢, dis 35¢

Miscellaneous.

American Packing.....10¢ 11¢ 12¢

Russia Packing.....14¢ 15¢ 16¢

Italian Packing.....13¢ 14¢ 15¢

Cotton Packing.....15¢ 16¢ 17¢

Jute.....7¢ 8¢ 9¢

Padlocks.—See Locks.

Pails.

Galvanized Iron—

Quarts.....10 12 14

Hill's Light Weight, \$ dos.....\$2.75 3.00 3.25

Hill's Heavy Weight, \$ dos.....\$3.00 3.25 3.75

Whiting's.....\$2.75 3.00 3.25

Sidney Shepard & Co.....\$2.00 2.25 2.50

Iron Clad.....\$2.75 3.00 3.25

Fire Buckets.....\$2.75 3.25 3.50

Buckets, see Wall Buckets

Indurated Fibre Ware.

Star Pail, 12 qt.....\$ dos \$4.50

Fire, Stable and Milk, 14 qt.....\$ dos \$5.50

Fenella's Faber's Carpenters......high list, dis 60¢

Huber's Round Gilt.....\$ gro \$5.50 net

Dixon's Lead.....\$ gro \$4.50 net

Dixon's 1.....\$ gro \$4.75 net

Dixon's Carpenters.....dis 40¢10¢

Picks.

Railroad, 5 to 6, \$12.00; 6 to 7, \$13. dis 60¢10¢60¢10¢25¢

Adze Eye, 5 to 6, \$12.00; 6 to 7, \$13. dis 60¢10¢60¢10¢25¢

Picture Nails.

Brass Head, Sargent's list.....dis 50¢10¢10¢

Brass Head, Combination list.....dis 50¢10¢10¢

Porcelain Head, Sargent's list.....dis 40¢10¢

Porcelain Head, Combination list.....dis 40¢10¢

Miles' Patent.....dis 40¢

Pinking Irons......\$ dos 65¢ net

Pipe, Wrought Iron.—List March 23, 1887.

14 and under, Plain.....dis 50¢

14 and under, Galvanized.....dis 45¢

14 and over, Plain.....dis 65¢

14 and over, Galvanized.....dis 50¢

Butter Tubes, iron.....dis 52½¢

Planes and Plane Irons.

Wood Plane.

Molding.....dis 50¢ 60¢25¢

Bench, First Quality.....dis 50¢10¢ 60¢

Bench, Second Quality.....dis 60¢10¢

Bailey's (Stanley R. & L. Co.).....dis 30¢10¢

Gas Pliers.....dis 60¢
 Gas Pliers, Custer's Nickel Plated.....dis 60¢5¢
 Eureka Pliers and Nippers.....dis 40¢
 Russell's Parallel.....dis 25¢
 P. S. & W. Cast Steel.....dis 50¢
 P. S. & W. Tinner's Cutting Nippers.....add 5¢ dis 10¢
 Sargent's Pat. Wire Cutters.....dis 20¢
 Morrill's Parallel, per dos.....dis 30¢5¢
 Cronk's S. in. \$15; 10 in. \$21.....dis 40¢ 40¢5¢

Plumbs and Levels.
 Regular List.....dis 70¢10¢70¢10¢10¢
 Diston's.....dis 45¢10¢
 Pocket Levels.....dis 70¢10¢70¢10¢10¢
 Davis Iron Levels.....dis 30¢
 Davis' Inclometers.....dis 10¢10¢

Peppers, Corn.

Round or Square, 1 qt.....\$ gro \$10.50 to \$12

Round or Square, 2 qt.....\$ gro \$23.50 to \$24

Post Hole and Tree Augers and Diggers.

Samson Post Hole Digger.....\$ dos \$38.00, dis 25¢10¢

Fletcher Post Hole Augers.....\$ dos \$36.00, dis 20¢

Eureka Diggers.....\$ dos \$16 to \$17

Leach's.....\$ dos \$8.50 to \$9.00

Vaughan's Post Hole Auger.....\$13.00 to \$14.00

Kohler's Little Giant.....\$ dos \$18.00

Kohler's Hercules.....\$ dos \$15.00

Kohler's New Champion.....\$ dos \$10.00

Schneider.....\$ dos \$18

Ryan's Post Hole Diggers.....\$ dos \$18

Cronk's Post Bars.....dis \$20, dis 50¢5¢ 50¢10¢

Gibb's Post Hole Digger.....\$ dos \$30, dis 40¢ 40¢10¢

Potato Parers.

White Mountain.....\$ dos \$5.00 to \$5.50

Antrim Combination.....\$ dos \$5.00

Hoosier.....\$ dos \$13.50

Pruning Hooks and Shears.

Diston's Combined Pruning Hook and Saw.....\$ dos \$13.00, dis 20¢10¢

Diston's Pruning Hook.....\$ dos \$12.00, dis 20¢10¢

E. S. Lee & Co.'s Pruning Tools.....dis 40¢

Pruning Shears, Henry - Pat.....\$ dos \$5.75 to \$4.00 net

Henry's Pruning Shears.....\$ dos \$4.25 to \$4.50 net

Wheeler, M. & Co.'s Combination.....\$ dos \$12, dis 20¢

Dunlap's Saw and Chisel.....\$ dos \$5.50, dis 30¢

J. Malinson & Co.....No. 1, \$5.25; No. 2, \$7.25

Pulleys.—For House, Awning, etc.....dis 60¢10¢

Japanned Screw.....dis 60¢10¢

Brass Screw.....dis 60¢10¢

Japanned Side.....dis 60¢10¢

Japanned Clothes Line.....dis 60¢10¢

Empire Sash Pulley.....dis 55¢ 60¢

Moore's Sash, Anti Friction.....dis 50¢

Hay Fork, Solid Eye, \$4.00; Swivel, \$4.50 { dis 50¢10¢5¢

Hay Fork, "Anti-Friction," 5 in. Solid, \$5.70.....dis 50¢

Hay Fork, "F" Common and Pat. Hushed.....dis 20¢

Hay Fork, Arbor Pat. Iron.....dis 20¢

Hay Fork, Reed's Self-Lubricating.....dis 20¢

Shade Rack.....dis 45¢

Tackle Blocks.....dis 45¢

Pumps.—Clatern, Best Makers.....dis 50¢ 10¢80¢

Pitcher Spout, Best Makers.....dis 60¢10¢ 60¢10¢10¢

Pitcher Spout, Cheaper Goods.....dis 70¢20¢ 70¢10¢25¢

Punches.

Saddlers' or Drive, good quality.....\$ dos 60¢ 65¢

Bemis & Call Co.'s Cast Steel Drive.....dis 50¢5¢

Bemis & Call Co.'s Springfield Socket.....dis 50¢5¢

Bemis & Call Co.'s Spring and Check.....dis 15¢

Bemis & Call Co.'s Spring and Check.....dis 15¢

Solid Tinner's.....\$ dos \$1.44, dis 55¢

Tinner's Hollow Punches.....dis 50¢2¢

Rice Hand Punches.....dis 15¢

Rail.

Sliding Door, Wrt. Brass \$ 35¢.....dis 15¢

Sliding Door, Iron, Painted.....\$ foot 7¢

Sliding Door, Light, 1 in.....\$ foot 4¢, dis 30¢10¢5¢

Per 100 feet.....\$2.50 3.00 4.40—dis 10¢

U. S. for N. & Hangers.....

Per 100 feet.....Small Med. Large

Terry's Wrought Iron.....\$2.15 2.70 3.25 net

Victor Track Rail, 7½ ft.....dis 50¢2¢

Carrier Steel Rail, per foot.....dis 45¢

Rails.

Cast steel.....dis 65¢25¢ 70¢

Mail tie.....dis 70¢ 70¢25¢

Gibbs Lawn Rake.....dis 12¢, dis 40¢

Canter Lawn Rake.....dis 12¢, dis 40¢

Fort Madison Prize Bow Brace and Pliers.....dis 65¢2¢

Fort Madison Steel Tooth Lawn Rake, \$5.....dis 35¢

Razors.—J. R. Torrey Razor Co.....dis 20¢

Westonholme and Butcher.....\$10 to \$2, dis 10¢

Razor Straps.

Genuine Emerson.....dis 60¢ 60¢25¢

Imitation Emerson.....\$ dos \$2.00, dis 20¢10¢25¢

Torrey's.....dis 20¢

Sadger's Best Combination.....\$ dos \$2

Lamont Combination.....\$ dos \$4

Rivets and Burrs.

Copper.....dis 70¢ 50¢10¢

Iron, list November 17, 1887.....dis 50¢ 50¢7½¢

Rivet Sets......dis 50¢2¢ 50¢10¢

Rods.—Stair, brass.....dis 20¢2¢

Stair Black Walnut.....\$ dos 40¢

Rollers.

Barn Door, Sargent's list.....dis 60¢10¢10¢

Acme (Anti-Friction).....dis 55¢

Union Barn Door Roller.....dis 70¢

Rope.—Manufacturers' prices for large lots.

Manila.....¼ inch and larger \$ 11¼¢ net

Manila.....½ inch \$ 11¼¢ net

Manila.....¾ inch \$ 11¼¢ net

Manila Tarred Rope.....\$ 10¼¢ net

Manila Hay Rope.....\$ 11¼¢ net

Manila.....¾ inch and larger \$ 8¼¢ net

Manila.....¾ inch \$ 8¼¢ net

Manila.....¾ inch \$ 8¼¢ net

Manila Hay Rope.....\$ 8¼¢ net

Manila Tarred Rope.....\$ 8¼¢ net

Manila Medium Lath Yarn.....\$ 7¼¢ net

Cotton Rope.....\$ 15¢ 18¢ net

Jute Rope.....\$ 7¢

Rules.

Boxwood.....dis 80¢10¢ 80¢10¢10¢

Ivory.....dis 50¢ 50¢10¢

Sad Irons.

From 4 to 10, at factory.....\$ 100 to \$2.50 to \$2.65

Self-Heating.....\$ dos \$2.00 net

Self-Heating, Tallors'.....\$ dos \$18.00 net

Gleason's Shield and Toller.....dis 25¢

Mrs. Post's Irons.....dis 40¢40¢5¢

Enterprise Star Irons, new list, July 30, 1887.....dis 40¢

Combined Fluter and Sad Iron.....\$ dos \$15.00, dis 15¢

Fox Reversible, Self-Fluter.....\$ dos \$24.00 net

Chinese Laundry (N. E. Butt Co.).....\$4¢, dis 15¢

New England.....\$4¢, dis 15¢

Mahony's Troy Pol. Irons.....dis 25¢

Sand and Emery Paper and Cloth.

List April 19, 1887.....dis 20¢ 20¢25¢

Sibley's Emery and Crocus Cloth.....dis 30¢

Sash Cord.

Common.....\$ lb, 10¢ to 11¢

Patent, good quality.....\$ lb, 13¢ to 13½¢

Syracuse Screw-Drivers Bits.....dis 30 & 30 1/2
Screw Driver Bits.....dis 50 & 75
Screw Driver Bits, Parr's.....dis 8 25
Fray's Hol. Hdl. Seta, No. 3, 12.....dis 25 & 10
P. D. & Co.'s, all Steel.....dis 50

Screws.
Wood Screws—List, Brass, Jan. 27, Iron, July 1, 1887
Flat Head Iron.....dis 70
Round Head Iron.....dis 65
Flat Head Brass.....dis 65
Round Head Brass.....dis 60
Flat Head Bronze.....dis 65
Round Head Bronze.....dis 60

Nails.
Flat Head, Iron.....dis 55
Round Head, Iron.....dis 50
Bench and Hand—
Bench, Iron.....dis 55 & 10
Bench, Wood, Hickory.....dis 22 25
Hand, Wood.....dis 25 & 10
Lax, Blunt Point.....dis 75 & 75 1/2
Coach and Lag, Gimlet Point.....dis 75
Bed.....dis 25
Hand Nail, Sargent's.....dis 60 & 10
Hand Nail, Humason, Beckley & Co.'s, dis 70 & 10
Hand Nail, Am. Screw Co., dis 75
Jack Screws, Millers Falls list.....dis 50 & 60
Jack Screws, P. S. & W.....dis 35
Jack Screws, Sargent.....dis 60 & 10
Jack Screws, Stevens.....dis 40 & 40 1/2

Screws.
Lester, complete, \$10.00.....dis 25
Rogers, complete, \$4.00.....dis 25
Rogers, complete, \$4.00.....dis 50 & 10

Shears.
American (Cast) Iron.....dis 75 & 10
Pruning.....dis 75 & 10
Barn's Lamp Trimmers.....dis 20
"Tinner's".....dis 20
Beymour's, List, Dec. 1881, dis 60 & 10
Heinrich's, List, Dec. 1881, dis 60 & 10
Heinrich's Tailor's Shears.....dis 30
First quality C. S. Trimmers.....dis 30
Second quality C. S. Trimmers.....dis 30
Acme Cast Shears.....dis 10 & 10
Diamond Cast Shears.....dis 10
Clippers.....dis 10 & 10
Victor Cast Shears.....dis 75 & 10
Howe Bros. & Hulbert, Solid Forged Steel.....dis 40
Cleveland Machine Co., Solid Steel Forged.....dis 70
Clausen Shear Co., Japaned.....dis 70
Clausen Shear Co., Nickel, same list.....dis 80

Shedding Doors.
M. W. & Co., list July 1888.....dis 60 & 10
R. & L., list Dec. 1888.....dis 60 & 10
Corbin's list.....dis 60 & 10
Patent Roller.....dis 60 & 10
Patent Roller, Hatfield's.....dis 75
Russell's Anti-Friction, list Dec. 18, 1888, dis 60 & 10
Moore's Anti-Friction.....dis 60

Shedding Doors.
R. & L., list Dec. 18, 1888.....dis 60 & 10
Barnett's list.....dis 60 & 10
Reading list.....dis 60 & 10
Ship Tools.
L. & J. J. White.....dis 30 & 5
Albertson Mfg. Co.....dis 55

Shoes, Horse, Mule, &c.
Burden's, Perkins', Phoenix, at factory.....\$4.00
Mule—Add \$1 per keg to above prices.

Ox Wrought—
Ton lots.....\$ 94
1000 lb lots.....\$ 94
500 lb lots.....\$ 94
Shot.—(Eastern prices, 2¢ off, cash, 5 days.)
Drop, 5 bag, 25 lb.....\$1.25
Drop, 5 bag, 5 lb.....\$.30
Buck and Chilled, 5 lb bag.....\$1.50
Buck and Chilled, 5 lb bag.....\$1.50

Shovels and Spades.
Ames Shovels, Spades, &c., list Nov. 1, 1888.....dis 30
NOTE.—Jobbers frequently give 5 & 7 1/2% extra on above.

Shovels and Spades.
G. Mith's Black Iron.....dis 50 & 10
Guth's C. S.....dis 60 & 10
Griffith's Solid Cast Iron.....dis 20
Old Colony (Sanford Fork & Tool Co.).....dis 20
St. Louis Shovel Co.....dis 20 & 20 1/2
Hussey, Shins & Co.....dis 15 & 25
Hubbard & Co.....dis 20 & 20 1/2
Lehigh Mfg. Co.....dis 50 & 10
Wayne Pettibone & Son, list January, 1888.....dis 70
Remington's, Lowman's Patent.....dis 40 & 10
Rowland's, Black Iron.....dis 50 & 10
Rowland's Steel.....dis 60 & 10

Shovels and Tongs.
Iron Head.....dis 60 & 10
Brass Head.....dis 60 & 10
Skels.
Western list.....dis 75 & 10
Columbus Wrt. Steel, list Nov. 1, 1887.....dis 20
Coldbrookdale Iron Co.....dis 50 & 10
Utica P. S. T. Skels.....dis 60
Utica Turned and Fitted.....dis 35

Sieves.
Buffalo Metallic, S. S. & Co., new list.....dis 50 & 25
Barber Flour Sifters.....dis 30
Smith's Adjustable Sifters.....dis 25
Smith's Adjustable Milk Strainer.....dis 20
Smith's Adjustable F. & C. Strainer.....dis 15
Sieves, Wooden, Rim, Flat, dis 70
Mesh 18, Nested, 5 doz.....\$ 70
Mesh 20, Nested, 5 doz.....\$ 80
Mesh 24, Nested, 5 doz.....\$1.00
Sieves.—School, by case.....dis 50 & 10

Snares, Harness, &c.
Anchor (T. & S. Mfg. Co.).....dis 60
Fitch's (Bristol).....dis 60
Hotchkiss.....dis 10
Andrews.....dis 60
Barnett's Patent Guarded.....dis 70 & 10
German, new list.....dis 40 & 10

Covert.
Covert, New Patent.....dis 60 & 10
Covert New R. E.....dis 60 & 10
Covered Spring.....dis 60 & 10

Soldering Irons.
Covert's Adjustable, list Jan. 1, 1886.....dis 35 & 25
Spoke Shaves.
Wood.....dis 45
Bailey's Stanley R. & Co.'s.....dis 40 & 10
Stearns.....dis 20 & 10
Stearns.....dis 30

Spoke Trimmers.
Bonney.....dis 10 & 10
Stearns.....dis 20 & 10
Free, No. 1, 1 1/2, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 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1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 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CURRENT METAL PRICES.

AUGUST 1, 1888.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market reports.

IRON AND STEEL.

Bar Iron from Store.

Common Iron:	
3/4 to 2 in. round and square...	1.90 @ 2.00¢
1 to 6 in. x 3/4 to 1 in.	
Refined Iron:	
3/4 to 2 in. round and square...	2.10 @ 2.25¢
1 to 4 in. x 3/4 to 1 1/2 in.	
4 1/2 to 6 in. x 3/4 to 1 in.	2.30 @ 2.45¢
1 to 6 in. x 3/4 and 5-16 in.	2.30 @ 2.45¢
Rods—3/4 and 1 1/2 round and sq.	2.30 @ 2.45¢
Bands—1 to 6 x 3-16 to No. 12.	2.30 @ 2.45¢
"Burden Best" Iron, base price.	3.00 @ ...
Burden's "H. B. & S." Iron, base price.	2.80 @ ...
"Ulster"	3.10 @ ...
Norway Rods	4.00 @ 5.00¢

Merchant Steel from Store.

Open-Heart and Bessemer Machinery.	Per pound.
Toe Calk, Tire and Sleigh Shoe, base price in small lots.	3 1/2¢ @ 3¢
Best Cast Steel, base price in small lots.	5 1/2¢ @ 9¢
Best Cast Steel Machinery, base price in small lots.	5 1/2¢ @ 6¢

For Classification and Extras adopted by the Merchant Steel Association of the United States, June 1, 1888, see *The Iron Age*, June 21, 1888.

Sheet Iron from Store.

Common American.	R. G. Cleaned.
10 to 16	2.75 @ 2.80¢
17 to 20	2.85 @ 3.00¢
21 to 24	3.00 @ 3.10¢
25 and 30	3.20 @ 3.50¢
27	3.35 @ 3.75¢
30	3.50 @ 4.00¢
B. E.	2d qual.
Galv'd, 14 to 20, 1/2 in.	4.38 @ ...
Galv'd, 21 to 24, 1/2 in.	4.75 @ ...
Galv'd, 25 to 28, 1/2 in.	5.25 @ ...
Galv'd, 27	5.62 1/2 @ ...
Galv'd, 28	6.00 @ ...
Patent Planished	10¢ @ 10¢
Russia	9 1/2¢ @ 10¢
American Cold Rolled B. B.	5¢ @ 7¢

English Steel from Store.

Best Cast	15¢
Extra Cast	16 1/2¢
Swaged, Cast	16¢
Best Double Shear	15¢
Blister, 1st quality	13 1/2¢
German Steel, Best	10¢
3d quality	9¢
3d quality	8¢
Sheet Cast Steel, 1st quality	15¢
2d quality	14¢
3d quality	13 1/2¢

METALS.

Tin.

Banca, Pigs.	24¢
Straits, Pigs.	23¢
English, Pigs.	24¢
Straits in Bars.	24¢ @ 25¢

Tin Plates.

Charcoal Plates.—Bright.	Per box.
Melyn Grade.	55.75 @ 56.00
" " IC, 12 x 13.	6.00 @ 6.25
" " IC, 14 x 20.	5.75 @ 6.00
" " IC, 20 x 28.	12.25 @ 12.50
" " IX, 10 x 14.	7.25 @ 7.50
" " IX, 12 x 12.	7.50 @ 7.75
" " IX, 14 x 20.	7.25 @ 7.50
" " IX, 20 x 28.	15.25 @ 15.50
" " DC, 12 1/2 x 17.	5.50 @ 5.75
" " DX, 12 1/2 x 17.	7.00 @ 7.25
Calland Grade.	56.00 @ ...
" " IC, 12 x 12.	6.25 @ ...
" " IC, 14 x 20.	6.00 @ ...
" " IX, 10 x 14.	7.50 @ ...
" " IX, 12 x 12.	7.75 @ ...
" " IX, 14 x 20.	7.50 @ ...
Allaway Grade.	55.25 @ ...
" " IC, 12 x 12.	5.50 @ ...
" " IC, 14 x 20.	5.25 @ ...
" " IX, 10 x 14.	6.25 @ ...
" " IX, 12 x 12.	6.50 @ ...
" " IX, 14 x 20.	6.25 @ ...
" " IX, 20 x 28.	12.50 @ ...
" " DC, 12 1/2 x 17.	5.00 @ ...
" " DX, 12 1/2 x 17.	6.00 @ ...

Coke Plates.—Bright.

Steel Coke.—IC, 10 x 14, 14 x 20.	\$4.80 @ ...
" " 10 x 20.	7.50 @ 7.65
" " 20 x 28.	10.00 @ 10.15
BV Grade.—IC, 10 x 14, 14 x 20.	4.70 @ ...
Charcoal Plates.—Terne.	
Dean Grade.—IC, 14 x 20.	\$4.62 1/2 @ ...
" " 20 x 28.	9.25 @ ...
" " IX, 14 x 20.	5.62 1/2 @ ...
" " 20 x 28.	11.37 1/2 @ ...
Abecarne Grade.—IC, 14 x 20.	4.50 @ ...
" " 20 x 28.	9.00 @ ...
" " IX, 14 x 20.	5.50 @ ...
" " 20 x 28.	10.80 @ ...

Tin Boiler Plates.

IXX, 14 x 26.	112 sheets.	\$12.50 @ \$12.75
IXX, 14 x 28.	112 sheets.	12.75 @ ...
IXX, 14 x 31.	112 sheets.	14.25 @ ...

Copper.

Duty: Pig. Bar and Ingot. 4¢; Old Copper, 3¢	
1 lb. Manufactured (including all articles of which Copper is a component of chief value, 45¢ ad valorem)	
Lake	@ 17.50¢
"Anchor" Brand.	@ 17¢

Prices adopted by the Association of Copper Manufacturers of the United States, December 10, 1887, being quotations for all sized lots.

Not wider than	Not longer than	And longer than	Weights per square foot and prices per pound.							
			Over 64 oz.	32 to 64 oz.	16 to 32 oz.	14 to 16 oz.	12 to 14 oz.	10 to 12 oz.	8 to 10 oz.	Less than 8 oz.
30-72			25	25	25	26	27	28	31	33
30-72			25	25	25	26	27	28	30	34
36-96			25	25	25	27	29	31	33	36
36-96			25	25	25	28	30	32	34	38
48-96			25	25	27	29	31	33	35	38
48-96			25	25	28	30	32	34	36	39
60-96			25	25	30	32	34	36	38	40
60-96			25	26	31	33	35	37	39	41
84-96			26	27	31	33	35	37	39	41
84-96			27	28	32	34	36	38	40	42
Over 84 in. wide			28	30	32	34	36	38	40	42

All Bath Tub Sheets.	16 oz. 14 oz. 12 oz. 10 oz.
Per pound.	\$0.28 0.30 0.32 0.35

Bolt Copper, 3/4 inch diameter and over, per pound. 25¢

Circles, 60 inches in diameter and less, 3 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Circles over 60 inches diameter, up to 96 inches diameter, inclusive, 5 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Circles, over 96 inches diameter, 6 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Segment and Pattern Sheets, 3 cents per pound advance over price of sheets required to cut them from.

Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, 1 cent per pound over the foregoing prices.

Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, 2 cents per pound over the foregoing prices.

Copper Bottoms, Pits and Flats.

14 ounce to square foot and heavier.	25¢
12 ounce and up to 14 ounce to square foot.	25¢
10 ounce and up to 12 ounce.	31¢
Circles less than 8 inches diameter 2 cents per pound additional.	
Circles over 18 inches diameter are not classed as Copper Bottoms.	

Tinning.

Tinning sheets on one side, 10, 12 and 14 x 48 each.	8¢
Tinning sheets on one side, 30 x 60 each.	30¢
For tinning boiler sizes, 9 in. (sheets 14 in. x 60 in.), each.	15¢
For tinning boiler sizes, 8 in. (sheets 14 in. x 56 in.), each.	13¢
For tinning boiler sizes, 7 in. (sheets 14 in. x 52 in.), each.	13¢
Tinning sheets on one side, other sizes, per square foot.	2 1/2¢
For tinning both sides double the above prices.	

Planished Copper.

Planished Copper List May 5, 1888. Net

Brass and Copper Tubes.

Seamless Copper.	Seamless Brass.
3/4 inch 1/2 lb.	3/4 inch 1/2 lb.
1/2 inch 1/2 lb.	1/2 inch 1/2 lb.
1/4 inch 1/2 lb.	1/4 inch 1/2 lb.
1/8 inch 1/2 lb.	1/8 inch 1/2 lb.
1/16 inch 1/2 lb.	1/16 inch 1/2 lb.

Roll and Sheet Brass.

Discount from list. 10 @ 15 %

Spelter.

Duty: Pig. Bars and Plates, \$1.50 100 lb. 5 1/4¢

Western Spelter. 5 @ 5 1/4¢

"Bergenport" 5 1/2¢ || "Bertha" | 7 1/4¢ @ 8¢ |

Zinc.

Duty: Sheet, 2 1/2¢ 100 lb. 6 1/2¢

600 lb casks 7¢ |

Lead.

Duty: Pig, \$2 100 lb. Old Lead, 2¢ 100 lb. Pipe and Sheets, 3¢ 100 lb. 4 1/2¢

American 4 1/2¢ || Newark | 4 1/2¢ |
Bar	5 1/4¢
Pipe, subject to trade discount.	6 1/2¢
Tin-Lined Pipe, subject to trade discount.	15¢
Block Tin Pipes, subject to trade discount.	40¢
Sheet, subject to trade discount.	7 1/4¢

Solder.

1/2 @ 3/4 (Guaranteed). 15¢

Extra Wiping 10¢ |

Antimony.

Cookson 13 1/4¢ @ 14¢ || Manufactured | 11 1/4¢ |

Plumbers' Brass Work.

Discount per cent.

Ground Bibbs and Stops.	55¢ @ 10¢
Ground Stops, Hydrant Cocks, &c.	55¢ @ 10¢
Corporation Cocks.	55¢ @ 10¢

Corporation Cocks, "Mueller" Pattern, from Western list.	55¢ @ 10¢
Ground Basin and Shampooing Cocks.	50¢ @ 10¢
Compression Basin Cocks.	50¢ @ 10¢
Compression Basin and Sink Cocks.	50¢ @ 10¢
Compression Pantry Cocks.	50¢ @ 10¢
Compression Double Basin and Shampooing Cocks.	50¢ @ 10¢
Compression Double Bath Cocks.	50¢ @ 10¢
Compression Bibbs, Urinal Cocks, Sill Cocks, Stops, Hopper Cocks, Hydrant Cocks and Ball Cocks.	50¢ @ 10¢
Basin Plugs and Basin Grates.	55¢ @ 10¢
Bath and Wash Tray Plugs.	55¢ @ 10¢
Bath Wastes and Washers, Bath and Basin Valves, Sewer and Vacuum Valves, Cistern Valves, Pump Valves and Strainers, Ship Closet Valves and Suction Baskets.	55¢ @ 10¢
Basin Clamps, Basin Joints and Strainers.	55¢ @ 10¢
Boiler Couplings, Ground Face, per set \$1.25.	10¢
Boiler Couplings, Plain Face, per set.	\$1.25 @ 10¢
Water Back Valve and Plain Couplings.	55¢ @ 10¢
Soldering Nipples and Unions.	55¢ @ 10¢
Union Joints.	60¢ @ 10¢
Hydrant Nozzles, Handles and Guides, Sockets and Clamps, Street Washer Screws and Guides.	55¢ @ 10¢
Hose Goods	55¢ @ 10¢

Steam and Gas Fitters' Brass and Iron Work.

Discount per cent.	
Brass Globe Valves.	60¢ @ 10¢
Finished Brass Globe Valves, with Finished Brass Wheels.	40¢ @ 10¢
Brass Globe Valves, with Patent Wood Wheels.	60¢ @ 10¢
Brass Globe Angle and Corner Valves.	60¢ @ 10¢
Brass Radiator Angle Valves.	60¢ @ 10¢
Brass Radiator Angle Valves, Frink's Patent.	60¢ @ 10¢
Brass Cross and Check Valves.	60¢ @ 10¢
Brass Check Valves.	60¢ @ 10¢
Brass Hose Valves.	60¢ @ 10¢
Brass and Iron Frink Valves.	60¢ @ 10¢
Brass Safety Valves.	60¢ @ 10¢
Brass Vacuum Valves.	50¢ @ 10¢
Brass Whistle Valves.	60¢ @ 10¢
Brass Balance, Back Pressure and Foot Valves.	50¢ @ 10¢
Brass Butterfly and Throttle Valves.	50¢ @ 10¢
Brass Pump Valves.	50¢ @ 10¢
Brass Steam Cocks.	57 1/2¢ @ 10¢
Brass Service, Meter and Union Meter Cocks.	57 1/2¢ @ 10¢
Brass Whistles, Water Gauges and Oil Cups.	60¢ @ 10¢
Brass Hollow Plug, Tallow and Globe Oil Cups.	50¢ @ 10¢
Brass Lubricators.	60¢ @ 10¢
Brass Air Valves.	60¢ @ 10¢
Brass Air Cocks.	60¢ @ 10¢
Brass Gauge Cocks.	55¢ @ 10¢
Brass Cylinder Cocks and Steam Bibbs.	50¢ @ 10¢
Brass Swing Joints and Expansion Joints.	50¢ @ 10¢
Brass Test Pumps.	50¢ @ 10¢
Brass Steam Fittings, Rough.	60¢ @ 10¢
Brass Steam Fittings, Finished.	2 @ 10¢
Brass Union Joints.	60¢ @ 10¢
Brass Soldering Unions and Nipples.	55¢ @ 10¢
Brass Hose Fittings, Fusible and Boiler Plugs.	55¢ @ 10¢
Iron Body Globe, Angle, Cross and Check Valves.	65¢ @ 10¢
Iron Body Safety, Throttle, Back Pressure, Butterfly and Foot Valves.	65¢ @ 10¢
Iron Cocks, all Iron.	65¢ @ 10¢
All Iron Valves.	65¢ @ 10¢

Miscellaneous.

Discount per cent.	
Cast Iron Fittings.	70¢ @ 10
Plugs and Bushings.	75¢ @ 10
Malleable Iron Unions.	67 1/2¢
Malleable Iron Fittings.	75¢

Paints.

Black, Lamp—Coach Painters'.	22¢ @ 24¢
" " Ordinary.	6¢
Black, Ivory Drop, fair.	12 @ 15¢
" " best.	24¢
Black Paint, in oil.	14 @ 18¢
Blue, Prussian, fair to best.	40 @ 55¢
" " in oil.	45 @ 55¢
" " Chinese dry.	70¢
" " Ultramarine.	18 @ 30¢
Brown, Spanish.	14¢
" " Van Dyke.	10 @ 12¢
Dryers, Patent American, ass'd cans, 9¢; kegs 7¢	
Green, Chrome.	15 @ 20¢
Green, Chrome in oil.	14 @ 18¢
Green, Paris.	40¢
Green, Paris in oil.	good, 30¢; best, 35¢
Iron Paint, Bright Red.	10¢ @ 12¢
Iron Paint, Brown.	10¢ @ 12¢
Iron Paint, Purple.	10¢ @ 12¢
Iron Paint, Ground in oil, Bright Red.	10¢ @ 12¢
Iron Paint, Ground in oil, Red.	10¢ @ 12¢
Iron Paint, Ground in oil, Brown.	10¢ @ 12¢
Iron Paint, Ground, Purple.	10¢ @ 12¢
Litharge.	60¢
Mineral Paints.	3 @ 4¢
Orange Mineral.	10¢
Red Lead, American.	61¢
Red Venetian (Eng.) dry.	\$1.65 @ \$1.70
Red Venetian in oil.	ass'd cans, 11¢; kegs, 8¢
Red Indian Dry.	9 @ 12¢
Rose Pink.	10 @ 12¢